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ABSTRACT

This report attempts to clarify certain aspects of educational research policy According to the preface, the objectives of a research policy cannot be formulated except in the context of educational and related policy goals. The organization of the decision-making process to achieve the objectives must be brought into the picture. In effect, research and development programs and institutions must be related to decision-taking both at policy and "grass roots" levels. A purpose of this report, therefore, is to provide a framework within which these complicated relationships can be examined. Part 1 provides an introduction to the study. Part 2 examines the concept of educational research policy by providing an analytical framework and discussing the differences between educational policy, research policy, and educational research policy. Part 3 looks at the validity of instrumental approaches to policy making. Topics covered in this section are a) criticisms of the instrumental approach, b) redefining the concept of authority, c) role of informative criticism, d) research and development process, and e) power structure. Part 4 focuses on the following conditions and instruments of educational research policy: a) present conditions of educational research and development, b) organizational instruments in educational research policy, c) research recruitment policies, d) resource allocation in educational research policy, and e) international collaboration. (Author/JS)

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EDUCATIONAL RESEARCH POLICY

technical report

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EDUCATIONAL RESEARCH POLICY

by

Kjell Eide

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Oslo, 31st August, 1970.

Kjell Eide.

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PREFACE

The view that in the next decade science and technology should play an increasing role in the achievement of social objectives is gaining rapid acceptance. The protagonists of this view formulate the problem as one of reorienting the goals of science and technology: science, having brought technological progress in industry, agriculture and defence, should now be brought to bear on areas such as education, transportation, urban development and health.

This viewpoint also implies that, in these new areas, the social sciences will grow in importance. They will be integrated in a comprehensive science policy covering all branches of scientific endeavour. New relationships between the natural and the social sciences will be forged.

There is an unwritten assumption in all this: that scientific knowledge and political action in relation to social problems have similar relationships to those in the field of natural phenomena. Crudely stated, it assumes that there are social "technologies" - that is to say rules for behaviour which can translate theoretical knowledge into operational practice. On the other hand, there is an equally respectable but different hypothesis about the way knowledge of social systems relates to policy or political action: knowledge does not prescribe, it restates problems and the options for dealing with them. It leaves choices open.

Research policy in relation to social problems, for example education, cannot escape this dilemma. The objectives of a research policy cannot be formulated except in the context of educational and related policy goals. The organisation of the decision-making process to achieve the objectives must be brought into the picture. In effect, research and development programmes and institutions must be related to decision-taking both at policy and "grass roots" levels.

The author of this Report, Mr Kjell Eide, has endeavoured to formulate a framework within which these complicated relationships can be examined. The merit of the Report is not so much that it provides precise proposals for establishing a policy for educational research, but that it proposes a framework for stating the relationships involved. It grapples with the way in which new knowledge can be effectively related to the objectives of education; what the role of scientific institutions should be in the total structure of the educational establishment; and how the different agencies involved should interact. Moreover, Mr Eide's analysis persistently, even if implicitly, keeps the research worker as an individual in the middle of the picture. The role of "informative criticism", which is at the centre of his analysis, recognises the naïvety of the assumption that research workers exist to provide "answers" to the "problems" of decision-makers.

This view of the role of educational research has considerable importance at the present time, when educational research is being pressed to produce more practical results. In effect, it argues that a powerful and practical role is played by restating problems and formulating policy options - as opposed to providing technological prescriptions. It should help policy-makers to arrive at a more realistic view of what they can expect from the increasing resources being devoted to educational research and development.

A second consequence of this viewpoint is that research, innovation and policy-planning must be seen as part of the same process. In effect, a policy for research which is divorced from policy objectives and decision-making mechanisms has no meaning in social sectors such as education, health and urban development. It would be tempting to draw the further conclusion that all three functions can be embraced in a restated concept of planning. Mr Eide's analysis suggests the wiser conclusion that progress will be made by recognising the complexity of the relationships involved, and improving effectiveness through more clearly defined roles and relationships between policy, planning and research agencies, rather than through any monolithic organisation.

The report is published in the hope that it will contribute not only to the debate about the organisation of educational research, but also to the wider discussion about the organisation of the research-development-innovation process in social sectors where public investments are rapidly increasing.

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SUMMARY

This paper represents an attempt to clarify certain aspects of education research policy. In order to achieve this aim, we have found it necessary to relate our discussion to more basic ideas about education, research, and policy in general. The conclusions reached depend to a great extent on this general frame of reference. We have therefore found it appropriate to spell out these underlying assumptions, though recognising that they have implications far beyond the field of educational research policy.

We start with the assumption that education is not a field of political decision-making with its "own" goals and its "own" instruments of policy. While conventionally a specific set of instruments may be defined as educational, the use of such instruments influences a wide range of goals for national policies. In fact, few societal goals are free of educational influence but education is never the only policy instrument for the achievement of such goals.

In this respect, research is in a similar situation. Its instrumentalities are even less internally interdependent, and more influenced by outside factors, than those of education. This causes us to suggest that research is less meaningful as a separate, institutionalised field of policy than education.

As a result, educational and research activity have a low degree of autonomy in decision-making models. It follows that responsibility for the achievement of societal goals must be shared between the various fields of policy, and at all levels in a decision-making hierarchy. This implies, in its turn, an extensive exchange of information between all task groups within a total organisational structure; an exchange not restricted to communication through points of co-ordination high in the hierarchy. It also implies the motivation, at all levels in the organisation, for integrating information in decision making.

Such motivation can only be fully achieved through a change in the authority structures which will replace the exertion of prescriptive authority and of bargaining strategies by non-directive information. This implies an active participation in decisions - a wide range of discretion - at all levels including the right of independent interpretation of the general goal structure.

It thus becomes necessary to redefine roles, and make the critical function an integral part of role expectations. Only through use or informative criticism can organisations adapt to changing conditions and reach rational decisions through interplay between the various decision-making units.

This is not simply a plea for decentralisation, or for "laissez faire" which can allow authority to be even more prescriptive within units at lower levels. Active policies are needed, by competent

authorities, to endow each individual with adequate discretion and to break down entrenched authority structures.

While informative criticism, and its alternative, prescriptive criticism, can hardly be exerted simultaneously by the same individual, the two critical functions are highly complementary in society at large. Prescriptive criticism stimulates the process of informative criticism. On the other hand, when prescriptive criticism leads to a change in power alignments desirable change depends decisively on the active functioning of informative criticism.

In this context research has an essential role to play but not as the sole generator of new ideas and insights, to be disseminated to an outside world of "users". Not a role of an elite licensed to exert prescriptive authority based on "professional" ideologies. But because researchers have wide discretion, research can contribute significantly to the development of an attitude of informative criticism in all centres of policy making, and at all levels of society.

Research policy should thus aim primarily at creating the conditions under which this critical role can operate. This means breaking down existing authority structures with their constraints to discretion which today hamper the performance of its critical function within research itself. It also means recognising that the sources of new insight are various and that no function - including research - has an exclusive leadership role to play in informative criticism.

Various forms of research, developmental activities, planning and administration, and practical work in the field can contribute to this process. They complement and must interact with each other to function adequately. All rank equally in importance, and no function should be regarded as subservient to others. No function should be assessed by the criteria of another function.

Furthermore, no strict division of labour between institutions, in terms of functions or responsibilities, should apply. Interchange of personnel, and compatible career structures should facilitate common communication and interaction.

Such is the general role of research as we conceive it, and it determines our views of educational research. In this paper, therefore, we see educational research policy more as an expression of a political purpose in education, than as an integral field of policy. If informative criticism becomes general and penetrates all layers of educational activities, educational research has an essential role to play.

This role, however, depends on the proper functioning of this process, particularly in individual schools. In education, as well as in other fields, it calls for a radical change in balance in authority structures as between prescriptive authority and non-directive information.

Present conditions of educational research are frequently not conducive to the effective performance of this role. Current research efforts frequently make no significant impact on educational practice because they are hampered by the barriers of discipline-

based university research, by traditional rules governing qualification for research work, and forced by lack of funds to concentrate on limited projects which lack the minimum autonomy in underlying research models to yield generally valid results. Complementary developmental activities are often quite limited, suffering also from misdirected "scientific" evaluation based on inappropriate criteria.

Three main sets of instruments are available for creating conditions in which educational research can play its proper role. They are organisational measures, recruitment policies, and resource allocation. We discuss each separately.

There is a need for a system of institutions, which we have grouped in three main categories, research/service institutions, research/teaching institutions, and research/application institutions. The categories are distinguished partly by their institutional location and interinstitutional relationships, and partly by the main orientation of their work; their chosen goal-structure.

No strict division of functions is envisaged. The range of discretion should be considerable in all institutional categories. University type institutions need, however, most freedom from limitations imposed from the outside. Their function might be termed "fundamental research" which is definable in terms of organisational characteristics rather than the nature of the research. We find no operational use for the term "fundamental research" in any other sense. There is, however, no reason why it should not be of e.g. developmental character.

All institutions should have a basic budget, providing for a nucleus of staff, and the building up of basic competence and operational programmes of their own choice. In addition, outside grants and contracts should form the basis for additional programmes.

The staff composition should be multi-disciplinary and represent varied backgrounds. Career patterns should be sufficiently compatible to permit frequent exchange of personnel, but performance must be assessed according to the relevant functions and not dominated by those of the well established professions in the field. On the contrary, existing professionalised roles should be modified and widened to break down the traditional rigid connections between professional roles and specific functions. This also applies to internal staff interactions; participation in decisions and a wide range of individual discretion should be ensured.

The principle of differentiated roles should also be applied to the organisational superstructure. Central university bodies, research councils, developmental agencies, and funding agencies within central government, all have their roles to play, acting from their particular goal orientation, and thus ensure that research performing institutions have a discretion.

The recruitment and training of personnel must serve the whole range of functions to be performed; a major reorientation of current training practices and qualification requirements will be necessary. The frequent monopoly of university institutions may need to be broken, and replaced by a new system of collaboration between a

variety of institutions. Authoritarian features of current training practices must be abolished, so that students will participate actively in decisions.

Recruiting personnel from other fields, within and outside that of research, would be necessary both to ensure rapid growth and open communication. Regular systems of exchange should be developed. An expanding and intellectually lively milieu for educational research might, however, be the strongest factor in attracting personnel from other fields.

Resource allocation in educational research, as in other fields, tends to be based on assessments of project feasibility. As a result, short term persectives are allowed to dominate policy, thus creating a cumulative bias in the distribution of resources. Long term policies, on the other hand, permit relevance to become critical as the conditions for feasibility may be developed with time. Relevance rather than short term feasibility, should be the aim of research policy.

The assessment of relevance, however, creates substantial problems, due to the complex interactions of most educational variables. The traditional requirements of "academic" research act as a constraint to the relevance of such projects. Valid answers to questions of relevance in education often seem more likely to be found through major developmental programmes.

One example of problems of "relevance" is the current cost structure of the educational system. The problems are only relevant educationally to a certain degree. They have mostly a low degree of autonomy as research models, and are not easily accessible to research. The trial and error method of practical developmental work, both at the micro and the macro level, are for a long time likely to contribute most to the gaining of new insights in education.

A fourth major instrument of research policy is certain aspects of international collaboration. There is not much in educational research, but the potential is substantial, though more for its impact on the quality of national research than because it will save national research efforts. The lack of an appropriate national research milieu prevents scientifically weaker countries from making effective use of the international pool of knowledge, the selection of relevant information being even more of a problem than the access to it. Co-operative research efforts should at least partly be viewed in this light; the emphasis should be more on stimulating national research and effective communication than on "in-house" research performance. This conflicts, however, with the predominant reward system in research.

The existence of an international research milieu, dominating national research standards leads to conflicts with national research priorities. This is most clearly seen in developing countries, but is equally true for economically advanced nations. Lack of proper criteria for research policies makes dependence on international standards - which may be of dubious relevance - even stronger. Most serious, however, is the transfer of values inherent in research approaches and findings. All the implicit assumptions underlying research models with a low degree of autonomy - reflecting nationally

predominant value structures - are imported with the "findings". Examples of this kind, including such notions as research as a primarily "product" - producing activity, are discussed later.

Research collaboration on a much bigger scale is needed, but its proper use requires that a number of conditions be fulfilled, and some of those conditions are listed. However, the essential function of such collaboration should be to widen traditional ideas about what is feasible in education, and to contribute to a more explicit examination and presentation of the value structures underlying current national practice. The prime purpose should not be to provide access to an abundance of research "products" of obscure relevance and value implications, but to enrich the process of informative criticism through all the educational system.

In all of our countries, educational research has only received a tiny fraction of resources devoted to education, usually about 0.1 per cent. It may appear ridiculous to expect efforts at this level to have a substantial impact. Yet, some quite significant impact can be traced, indicating that increased efforts may yield major results.

But there is no cheap way of obtaining revolutionary changes in education. When education is sometimes expected, of itself, to cure basic diseases of contemporary society, neither research nor any other set of educational measures can offer the solution. However, when given adequate means - and this implies resources of an order of magnitude quite different from the present - educational research has the potential to make an essential contribution to fundamental changes in education.

To do so requires a policy which allows research to function in a general climate of informative criticism, penetrating the whole of the educational system, and interacting with prescriptive criticism. Only in such conditions can research fulfil its basic critical function, to the benefit of human progress.

A. INTRODUCTION

In many areas of human activity research and development work is accepted as an essential source of continuous innovation, and the results of such work form the basis of policy, planning, management and practical execution. In education - in policy as well as in practice - the impact of research and development work appears to be small compared to other factors and considerations. This raises the following questions:

> Is this due to the particular nature of the educational process - and, if so, what makes education less amenable to R and D?
>
> Is this due to the particular nature of educational research in research policy terms - and if so, why?
>
> How far can the explanation be found in the absence or failure of a well-directed policy for educational R and D?

Such questions cannot be tackled without reference to a theory of the nature of policy-making, of education and of research and development. The first part of this document outlines some elements of such a theory first in terms of a formal decision-making structure based on goals and instruments, secondly in terms of a different and more realistic concept of authority, and finally in terms of the informal power structure surrounding policy-making.

In the second part, problems facing policy-makers are discussed. For example, what aspects of the present situation in educational R and D are not compatible with those general criteria, what organisational instruments are available and how should they be used; how can recruitment practices be made consistent with general policy aims in this field; how can priorities for resource allocation be established.

Much of the following analysis is equally relevant to policies outside the field of education. Research policy in education is not unique; on the contrary, this particular field of activity may be well suited to illustrate general principles, which in other fields are obscured by particular features of contempory societies.

B. THE CONCEPT OF EDUCATIONAL RESEARCH POLICY

1. Outline of an Analytical Framework

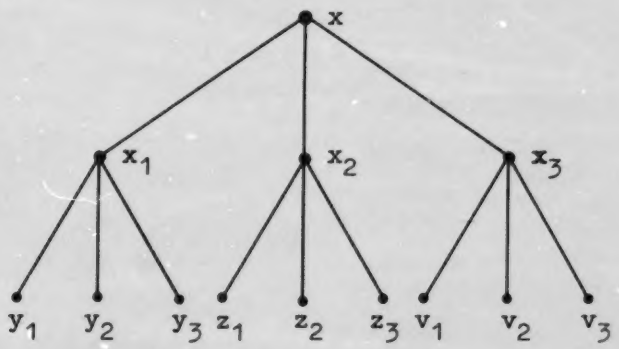
To give a more definite meaning to such terms as "policy", "education" and "research", a general theoretical framework is necessary.

A general definition of policy might be decision-making on the basis of normative criteria. When nothing else is said, we are concerned with national policy; with decisions taken by bodies entrusted with authority to act on behalf of the nation as a whole.

The normative character of policy decisions implies that they refer to more or less defined goals, which, related to each other in a certain way, form a goal structure. The commitment to serve such goals is implicit in the authority entrusted to the decision-making bodies. For our purpose, there is no need to define the nature of the goal structure. Nor do we have to assume that the goal structure is well enough defined to provide definite decisions when the necessary factual information is available. We may well assume, for example, that a bargaining process takes place before final decisions are being made.

Within a formal organisational structure the decision-making process includes decisions taken at various "levels" within the organisation. The goal structure may be broken down into individual sub-goals, and each sub-unit within the organisation may be entrusted with the responsibility for promoting its specific sub-goal with all the means available to it. But the tasks of sub-units may also be differently defined. They may each be entrusted with the control of a specific set of policy instruments to serve the total goal structure of the organisation. A simple illustration of such a decision-making structure is given in Fig. 1.

Fig. 1.



In the case represented in Figure 1. three subordinate decision-making bodies carry responsibility for serving the sub-goals x_1, x_2 and x_3 respectively. They all report to a superior body responsible for the general goal structure of organisation X. X. is thus a function of the sub-goals x_1, x_2 and x_3.

The first sub-unit has at its disposal three policy instruments, y_1, y_2 and y_3, by which its particular sub-goal can be served. Correspondingly, the two other sub-units have at their disposal the policy instruments z_1, z_2 and z_3, and v_1, v_2 and v_3 respectively. The three sub-goals are thus functions of the policy instruments ("action parameters") at the disposal of each of the sub-units.

If the values of the three goal variables are exclusively determined by the instrument variables controlled by the corresponding sub-units(1), decisions taken by those units should, in principle, be optimal with reference to the general goal structure of the organisation. The superior decision-making body allocates resources among the three sub-units in accordance with its goal structure. In such a case, the decision-making model of each of the sub-units is autonomous, in the sense that no outside factors influence the internal interrelationships of the model(2).

In practice, such cases of autonomy in decision-making are rare, and perhaps non-existent. There are three typical deviations from this "ideal" pattern, from the point of view of the individual sub-unit.

(a) Achievement of the sub-goal assigned to the decision-making unit is influenced by policy instruments outside its control.

(b) Policy instruments controlled by the decision-making unit also influence the achievement of goals assigned to other decision-making units.

(c) The decision-making unit operates according to internally generated goals with no relevance to the general goal structure of the organisation.

These three cases are illustrated in Fig. 2.

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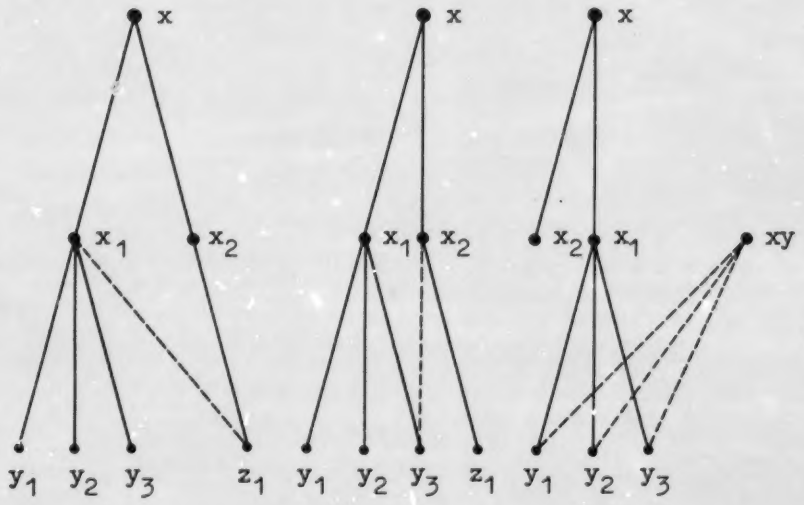
(1) This refers to the proposition that variation in x_1 is fully "explained" by variations in y_1, y_2 and y_3, and correspondingly for the sub-goals x_2 and x_3.

(2) This refers to a situation in which programme budgeting philosophy is valid. The autonomy of the decision-making model should not, however, be confused with independence in decision-making, i.e. the degree of discretion entrusted to the sub-unit.

Fig. 2.



case (a) case (b) case (c)

In case (a), the sub-unit does not control the proper means to fulfil its particular sub-goal. It may disregard the instruments outside its control - often enough not brought to its attention - and concentrate on the best possible use of its "own" instruments. Alternatively, it may try to find ways of gaining control over instruments entrusted to other units.

In case (b), the way the sub-unit uses its instruments influences matters for which it has no formal responsibility. It may disregard such consequences of its decisions - of which it is often enough not even conscious - and act as if they did not exist. Alternatively, it may adapt the use of its own instruments in view of their "outside" consequences, so that it accepts, in line with its "own" goals, the sub-goals of other units.

In these two cases, rational decisions by the sub-units can only be achieved in two ways: either the control of relevant policy instruments is shared by more than one decision-making unit(1), or the decision-making units share the responsibility for the various sub-goals, while maintaining the full control over their particular instrument variables.

Neither of these solutions guarantees decision-making by each unit so as to conform to the general goal structure of the organisation. In the first case, the problem of allocation of policy instruments among various sub-goals arises, and in the second, each decision-making unit will not necessarily apply a normative weighting of sub-goals corresponding to the general goal structure (X). A

(1) This is the favoured solution by advocates of programme budgeting.

decision-making structure such as the one described here provides no solution to these problems.

In case (c), internally-generated goals are implied. The problems caused are discussed later.

The degree of autonomy in decision-making models is thus a key concept in our analysis, since in a hierarchical organisation, the most rational way of delegating authority appears to be the creation of sub-units with the highest possible degree of autonomy in their decision-making models.

In political decision-making, a similar rule is valid(1). A field of policy should, in principle, be definable by a set of policy aims and instruments which provide a basis for rational decisions. The decision-making model of such a field should thus have a reasonable degree of autonomy.

Whether a field of policy should be mainly defined in terms of specific sub-goals derived from a general goal structure, or in terms of the exclusive control of certain policy instruments, depends on the nature of the autonomy of its decision-making model. If the sub-goals in question do not influence too strongly the achievement of sub-goals in other fields of policy, while the relevant policy instruments show a high degree of interdependence with those of other fields, the former solution appears most rational. If sub-goals are highly interdependent while the instruments have only limited interrelationship with instruments assigned to other fields, the latter solution should be chosen(2).

The concept of autonomy of decision-making models, and the nature of this autonomy, are implicit in the following discussion on educational and research policies. Similar considerations are relevant within the field of research itself, since they bear on such issues as the impact of the present system of scientific disciplines. the design of research projects and the organisation of research activities in general. In an even more general perspective, the concept of autonomy will be considered in relation to the discretion afforded to individuals and institutions in performing their functions and their role within an overall societal framework.

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(1) Provided the need for a consistent national policy is accepted.

(2) In this context, it would take us too far to go into the ways in which such interdependencies at various levels of decision-making can be assessed. Clearly, the distinction between ends and means - goals and instruments - is an artifact, depending upon the normative value one may wish to attach to the various factors involved in a decision-making model. Yet, in principle, it may be possible to approach the question of measuring empirically the interdependencies between such models, thus assessing in quantitative terms both the degree of autonomy and its nature. The study of marginal cross-flexibilities in production theory offers, e.g. an interesting analogy.

II. Educational Policy

Educational policy, as usually defined, relates primarily to the control of certain types of institutions, constituting "the educational system". The activities of those institutions are highly interrelated, and the main inputs into educational activities - pupils, teachers, schoolbuildings, textbooks etc. - are often assumed to be unique. There is now a tendency towards closer integration of the educational system, reflected e.g. in the fact that increasingly, educational institutions are being brought together under one policy-making body, the "Ministry of Education".

However, activities producing effects similar to those produced by the activities of educational institutions, are taking place on a large scale outside this institutional framework. Education is a part of individuals' efforts at work, a part of their spare time activities and activities within families, and is evinced in the interaction of family and school.

Some estimates indicate that, in terms of resource input, such educational activities may be at least as large as the input directly available to educational institutions(1). If so, the assumed high level of independence of educational institutions as instruments for policy is put in doubt. As yet, however, educational policy has only to a limited extent been able to adapt to this situation.

In terms of goals, it is fairly generally accepted in principle, that the goals served by education are not exclusively "educational". Most social goals are influenced by educational activities. On the other hand, in hardly any case is education the only activity serving those goals. It is virtually impossible to establish a set of independent goals for educational policy. When attempted, it leads to disregard of essential consequences of educational activities, and of non-educational factors influencing the stated goals.

This is especially apparent when educational goals are explicitly or implicitly established by the professional groups involved in education, on the basis of "professional ethics" or other sets of peer group expectations. In formulating educational policies, such influences are frequently strong, and the particular interpretations of educational goals implied are deeply embodied in the predominant professional roles in this field, such as those of the primary school teacher, or of the university professor. Goals of education may thus seem well-defined but in fact reflect the kind of sub-unit behaviour described in the previous chapter, where the low degree of autonomy of decision-making models is disregarded.

This may be illustrated by the attempt to derive educational goals from the study of child development, when such development is thought to be substantially autonomous. The educational task is thus the removal of obstacles to, and the general promotion of, this independent development. Unless one accepts an extremely unrealistic

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(1) A Norwegian study based, however, on rather uncertain assumptions, infers, for instance, that the organised educational system absorbs only about 40 per cent of societal resources spent on educational activities.

degree of complementarity between all facets of a child's development(1), such attempts are bound to fail. The development of the various faculties of a child, and the relative emphasis put on each of them, cannot be determined without conscious or unconscious reference to normative values derived from outside the educational sphere. Thus child development theories offer no escape from the normative weighting of general policy goals, far beyond the realm of education.

The widely accepted goal of equal educational opportunity offers another example. The concept of equality is in itself difficult to define meaningfully, as demonstrated with particular sharpness in the case of education for specific minority groups. Is equal opportunity for such groups best attained through granting full recognition to, and social acceptance of, their particular sub-culture, or through full assimilation into the mainstream culture? The principle of equality provides no answer; other general values of society have to be insinuated. As, in fact, all our societies consist of a wide set of interwoven sub-cultures, educational policies cannot avoid a normative evaluation of the various elements of those cultures, based on value criteria generated largely outside the field of education, and intrinsically associated with non-educational policies.

This may also explain why "systems analysis" in education, though fashionable, has met with such limited success. Education is not a "system" with its "own" goal structure; the autonomy necessary for systems analysis is not present.

Similarly, attempts to analyse education in terms of a one-dimensional goal structure, for example in relation to economic growth or manpower requirements, have also failed to gain general acceptance, possibly because of the absence of autonomy in such models.

Furthermore, educational policy fails to satisfy the ideal conditions of programme budgeting. It still remains an area most adequately defined in terms of its control of certain policy instruments, not in terms of exclusive sub-goals to be served.

III. Research Policy

In terms of its actual and potential consequences, research influences practically all societal goals, but in practically no case is research the only means serving those goals. As a field of policy, research has no independent goal structure(2).

Research policy aims are frequently stated in such terms as "raising the level of basic research", or "improving the conditions of research". Professional researchers are also assumed to possess established quality standards, distinguishing between "good" and

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(1) Piaget's theories are sometimes misinterpreted to this effect.

(2) Fundamental research, in this context, acts primarily as an internal development of instrumentalities, serving eventually goals also influenced by other types of activities.

"bad" research, and they certainly act accordingly. However, as long as such aims or quality standards are not related to more general goals, which are also valid outside the field of research, they have no direct relevance to policy decisions. They may well represent internally generated goals as illustrated in case (c).

Research policy is, in fact, usually defined in terms of policies relating to a set of instruments, in particular the institutional framework for research activities and the assumed unique input into those activities. Taking Figure 1 as an example, the three decision-making sub-units are the ministeries for education, social affairs and economics, and the three policy instruments available to each ministry may be (1) financial instruments, (2) legal instruments, and (3) developmental instruments, including research. Clearly, those three instruments are necessary to policy-making in each of the fields mentioned. Whether in such a system a relevant research policy can be formulated depends upon the interrelationship between the three variables y_3, z_3 and v_3, which each symbolise research efforts.

Such interdependence may exist in terms of the need for co-ordinated use of research resources. Qualified researchers, research facilities, including adequate research milieus and established frameworks for theoretical analysis, are almost unique to research, and to that extent are independent of other types of activities. The question remains, however, to what extent such resources may be substituted within research. To what extent are various types of research activities commonly interdependent?

In this respect, it appears that research activities have less in common than educational activities. As a field of policy, research is far less autonomous in its decision models than are educational activities. This may explain why most attempts to establish organisational frameworks for national research policy have either failed, or, when established, have tended to become pressure groups for specific interests.

Existing bodies concerned with research policy tend to ignore most societal goals which are or can be influenced by research, and to concentrate instead on one or a few aspects of a relevant goal structure. While in education attempts to distort the fundamental goal structure have mainly been resisted, research policies still suffer from such biases. The decision-making structure thus becomes increasingly irrational in its response to the general goals of society.

In all countries there is some level of governmental co-ordination in the use of financial and legal instruments. Budgetary co-ordination is provided by a ministry of finance, while the use of legal instruments operates within a general system of legislation, usually to some extent controlled by a ministry of justice.

For a similar co-ordinating function to operate in the field of research, proper recognition of the full range of societal objectives served by the policy instruments in question would be necessary. As long as the idea predominates that research policy has its own objectives, or should be linked primarily with particular objectives of

society(1), research policy will not reach the maturity of being a proper field of policy.

IV. Educational Research Policy

The conventional definition of educational research policy might be "developing research as an instrument to serve the goals of educational policy". However, it is clear that this definition is not meaningful if educational policy has no goals of its own.

Another definition of educational research might be research serving to promote activities undertaken by educational institutions. This definition, however, takes no account of the possible inter-relationship between educational activities within and outside such institutions.

Educational activities might be defined more broadly, independently of whether they take place inside educational institutions or not. However, activities which are closely related to non-educational activites in work, spare time and family environments would then be included which might result in the creation of decision-making models with a level of autonomy which would make rational decisions extremely difficult.

Whatever definition is applied to education, it is clear that many different types of research are relevant to it. Within the research field, decision-making structures are usually organised according to scientific disciplines characterised by homogeneity in terminology, a common theoretical framework, a specific set of phenomena eligible for observation, specific institutional arrangements and - quite frequently - an element of common "professional" value indoctrination. Within each discipline, a certain level of instrumental autonomy seems to have been achieved, and the process of professionalisation often aims at providing a minimum level of autonomy even in the goal structure(2).

Within such decision-making structures, there are also sub-units concerned with "educational research"(3). A decision-making unit of this kind is, in principle, based on a specific goal structure related to the problems of education. However, educational research in this sense has not achieved a high level of instrumental autonomy in terms of its own unique theoretical framework.

Research organisation in general, and the universities in particular, are characterised by diversified goal structures, mainly generated within the different disciplines. There is little in the common goal structure of such institutions and where there is commonality it mainly concerns rules about how research is to be performed. Such conventional rules are derived from work within the

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(1) Typically economic growth, often assumed to be primarily dependent upon the promotion of manufacturing industries.

(2) The euphemistic phrase "professional ethics" is frequently used in this context.

(3) Sometimes the more narrow term "pedagogical research" is used.

traditional disciplines, and are easily violated by emphasis on other goals. An inter-disciplinary field, such as educational research, is, therefore, easily adversely affected by different concerns.

This appears to be what usually happens. Although narrowing down their theoretical and conceptual framework to make educational research resemble a discipline, educational researchers have still not obtained full respectability by conventional university standards. Yet, in opting for respectability, they fail to be relevant to educational problems.

There are many reasons for this situation, and some of them will be more closely examined. At this stage, it is sufficient to state that research needs emerging from educational activities go far beyond what can be met by "educational research" as defined in most university settings. This implies that the relevant research instruments are not specific to education, and have a low level of instrumental autonomy. Educational research is thus a field of activity satisfying few of the conditions necessary to establish a proper field of policy, as defined here. Any decision-making model in this area will have a low degree of autonomy in terms of independence both in its instruments and its goals.

This situation complicates any serious attempt to "establish educational research priorities", "define educational research needs" and the like. It also helps to explain the often-heard complaint that research does not seem able to give clear answers to pertinent questions about education. Educational research is said to compare unfavourably with research in such fields as health, industry and agriculture.

Such a comparison may, however, reflect a misinterpretation of the actual situation. For instance the one-dimensional goal of education could be defined as the highest possible performance of pupils according to a given scale of achievement. If this were so, it would be much easier for educational research to provide answers to questions posed. In educational policy, however, such a one-dimensional goal structure is largely rejected as education is known to have a far broader impact on society than is indicated by any one-dimensional scale.

Basically, the situation is similar in industry. The working conditions offered there largely determine the quality of life of a large part of the population. Potentially, the work situation offers a prime opportunity for self-realisation. Beyond the walls of the factory, industrial activities influence where we live and the quality of our environment. Through sales policies industry influences our consumption patterns and, also, in all likelihood, value structures.

However, industrial research is hardly concerned with any of these essential questions. Its predominant aim is to change processes for the manufacturing of goods, and to improve the profitability of individual firms. In doing so, it simply reflects the limited goals of the existing decision-making structure. The relevance of industrial research to any general goal structure of society is, however, far more doubtful.

In the field of medical research, the relevance of a one-dimensional goal structure may be even more generally accepted. Even in this case, however, the present goal definition might gradually emerge as too narrow to reflect properly the actual impact of health activities on major societal goals.

What appears to be high efficiency in research performance may thus, in fact, reflect inadequate formulation of sub-goals in the field of policy concerned. A proper formulation of such sub-goals in terms of a general goal structure of society might prove that the present answers provided by research are not only insufficient, but even misleading.

So, educational research policy is not unique in this respect. However, societies are so organised that there is no easy escape for educational policy-makers. The multi-goal nature of educational policy is commonly recognised, and the responsibility cannot be "defined away" as easily as in certain other fields.

There thus appears to be little room for special policy-making bodies, controlling specific "educational research", and entrusted with the full responsibility for the achievement of its sub-goals. Yet, problems must be solved, decisions made, and operational activities conducted. What is, then, the proper framework for such functions? The answer to this question may call for an examination of the conception of policy, of organisation, and of the research function itself.

C. THE VALIDITY OF INSTRUMENTAL APPROACHES TO POLICY-MAKING

1. Criticisms of the Instrumental Approach

The analytical framework outlined above operates with goals and sub-goals and with policy instruments serving such goals. Implicitly the assumption is made that a hierarchical structure is concerned in which authority is delegated to lower decision-making levels. Consistency with the general goal structure of the organisation of decisions at lower levels is ensured through directives from above, enforced by a system of rewards and sanctions. At each level, activities further down in the hierarchy are regarded as instruments to serve the particular goal entrusted to each decision-maker.

This analysis points out the inherent weaknesses of such a structure when applied to a world where phenomena are strongly interdependent. Also, in such a world, the assumtion of autonomous decision-making models may lead to a high degree of irrationality in actual decision-making. This is not only because the distribution of responsibilities between sub-units, or "fields of policy", is badly thought out, or has become obsolete, in terms of the autonomy of their decision-making models(1). Even if organisation were improved in this respect, its decision-making process would still suffer from such deficiencies, because sub-goals cannot be delegated without cutting across essential inter-dependencies.

This instrumental approach to the analysis of policy-making has therefore for long been under attack but the premises for this criticism, however, vary considerably.

Modern organisational theories point out that decisions are made by human beings, whose judgements are influenced by many other factors than devotion to a particular interpretation of the goal structure of an organisation, and the particular sub-goals assigned to individual decision-makers at various levels in the hierarchy. Value structures are affected by membership of social groups and not solely by particular work functions. Proper use of human capacity, therefore, cannot be based on the assumption that humans can be regarded as machines which are programmed according to specific organisational requirements. Creative participation in any kind of activity requires a degree of personal involvement not easily obtained through the usual kind of reward and sanction systems.

Theories of social change reinforce such views. Genuine change cannot be obtained only through directives from above. Real motivation based on involvement and participation is necessary at all levels within an organisation. "Grass roots" initiatives should be promoted and given a chance to reach and influence the higher decision-making levels.

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(1) As suggested in programme budgeting theory.

A perhaps more basic critique, strongly reflected in the student revolution, suggests that a conservative tendency is built into such an instrumental approach. If the functions regarded as policy instruments, including research, are restricted to the effective programming of operational activities with reference to stated goals, no room is left for continuous examination of the goals themselves at the various points of decision-making. Future developments become tied to the present situation so that current value and power structures are maintained.

Related to this criticism is a moral reaction against the deliberate use of other human beings as instruments for any cause. Such "manipulation" is regarded as a threat to the freedom of individuals, as well as a means of serving the present power structure(1).

Reinforcing those arguments, a number of scientific studies indicate a considerable degree of dynamism in human value structures which may have changed radically in recent years. Thus, maintaining present power structures does not only mean keeping opponents out of power, but also a growing gap between actual policies and the fundamental values held in society.

Finally, in the field of research itself there have always been strong doubts about the feasibility of systematic programming of research. Scientific break-throughs are said to appear spontaneously, as a consequence of the researcher's free search for truth. They are likely to be hampered by attempts to interfere with and direct the researcher's work. Thus, the role of research, and of university research in particular, should first of all be to perform a critical function in society, free of any influence of the existing power structure.

Such critiques - stated here in inadequate and simplified terms - appear to raise more questions than they answer. Yet, they seem to have enough substance to deserve attention. The first question to be asked may be whether we are faced with (at least) two fundamentally different philosophies, two irreconcilable ways of conceiving policy.

II. Redefining the Concept of Authority

The extreme views on each side are obviously incompatible, and equally unacceptable. Extreme instrumentalist views - as well as the concept itself - have mainly been defined by opponents of instrumentalism; it is hard to find defenders of such positions. But the more extreme criticism fails to realise that certain problems can

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(1) Criticism appearing in this form is often said to be influenced by existentialist and neomarxist thinking, in contrast to the positivistic philosophy assumed to be behind the so-called "instrumentalism". Such relationships, however, are far from clear. A similar critique has long been raised on positivistic grounds, while existentialist and marxist thinking certainly do not preclude conclusions very different from those mentioned above. The interpretation of the questions involved as reflections of a difference in philosophical background seems, therefore, to confuse the issues more than clarify them.

only be solved by collective bodies representing, even if imperfectly, society as a whole. Such bodies would fail the responsibilities entrusted to them if they did not think in instrumental terms - examine the ways in which their assigned tasks can best be achieved. Such activities as economic production, education, social services, and applied research, cannot be performed without concern of this kind, implying "manipulation" in terms of influencing the premises of other people's decisions(1).

Furthermore, the implicit assumption in some of the critiques, that each individual operates an autonomous decision-making model, is false. Absence of authority exerted through public policy-making is likely to leave room for other, perhaps more manipulative, influences. The basic criticism against the assumed "free choice" of the consumer is, in fact, powerful in this case.

These are issues of substance and their answer lies in a redefinition of the concept of authority. Defined as the ability to influence the premises of other people's decisions, authority can, in fact, be exerted in all directions within any organisational hierarchy. Such a concept accepts the fact that people act, and should be left discretion to act, according to their own value structures, and according to their own interpretation of more basic organisation value structures.

Today the role of public policy is in many cases primarily to safeguard the individual's real freedom of choice, not only through legal and financial measures, but in terms of shielding individuals from undue religious, political and other pressures, for example in the school system. Another case is the safeguarding of public administration and research institutions from too strong pressure group influence. In the case of universities, instead of threatening "academic freedom", public authorities have good reasons for urging that they should make fuller use of the actual freedom granted to them, by loosening the grip of traditional, ritualistic rules of behaviour which they have imposed upon themselves.

In organisational terms, policy-making bodies need to be concerned beyond the actual reach of the instruments directly at their disposal, and to be responsible beyond any particular sub-goals traditionally assigned to them. They will have to develop non-hierarchical ways of influencing other bodies' use of their particular instruments, and learn to tolerate intervention by other bodies in "their own affairs"(2).

Such principles have wide implications. They suggest that rational decisions frequently require "open" systems of organisation, in which sub-units and individuals act from a feeling of responsibility towards the total organisational structure. This implies a

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(1) No moral quality can, in fact, be assigned to manipulation in this sense. To be morally meaningful the concept of manipulation must be construed in terms of the degree to which the consequences and the purpose behind the manipulation are explicitly spelled out.

(2) In terms of the graphical illustration in Chapter B. I. (figures 1 and 2), this simply means the formal acceptance of the dotted lines connecting different units, as an essential aspect of reality.

normative weighting of the various sub-goals, not necessarily in conformity with the central authority's particular interpretation of this goal structure(1). What appears to be a case of goals internally generated by a sub-unit(2) may actually represent such a deviating interpretation of the general organisational goals. The central authority may still be in a position to enforce its interpretation in terms of the final decisions reached, through its system of rewards and sanctions. The sub-unit, however, has a legitimate right to base its proposals upon its own interpretation of the total goal structure and, within the limits of its discretion, to act accordingly.

Correspondingly, fields of policy should represent open systems, defined in terms of policy instruments, but not restricted in terms of responsibility towards the general goal structure of national policy. If a government of responsible ministers regarded themselves only as the defenders of the particular interests of their respective fields of policy, government decisions would be taken according to the rules of a zero-sum game, in which nobody could win unless somebody else lost correspondingly(3). If they all know their game, and no commitments to overall goals hamper the play, the result will be an allocation of available resources by fixed proportions. As an example of rational decision-making within an overall structure of national goals, the outcome is in line with decisions arrived at by tossing a coin(4).

The legitimate concerns of responsible authorities within a field of policy should also reach far beyond their "own" field in the traditional sense. Educational policy-makers should be concerned about research in general, as well as about essential parts of social services, economic policy measures and the like. Correspondingly, science policy-makers should rightly be concerned about education, as well as innovation processes in general.

Problems arise, however, when such concerns lead to attempts to influence prescriptively decisions in related fields, as when science policy-makers attempt to expand their range of prescriptive policy into both the above mentioned fields. The distinction between policy prescription and policy concern may, therefore, need further comment.

The right to prescribe decisions, and to enforce their implementation by means of rewards and sanctions, is limited to responsibility for operational activities, which again relates to control over policy instruments. Beyond the limits of this control, authority

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(1) Termed X in our illustration in Chapter B. I.

(2) Cfr. case (c) in Figure 1 (Chapter B. I.)

(3) The situation will be different if the prime minister or the president has a dominant position, thus representing in person an overall goal structure. The case outlined here refers to "collegial" organisation of central government, not infrequent in European countries.

(4) This may be a reason why coalition governments often prove ineffective.

can only be exerted in the form of negotiations(1), or through the supply of information. While, in principle, bargaining can take place only horizontally, between parties at the same level of decision-making, authority can be exerted both horizontally and vertically through the means of information.

These two forms of exerting authority have quite different implications, and may often prove to be incompatible. In a bargaining process, information is an instrument for power, not likely to influence the other party(2). Normally, information will only influence behaviour when the receiver is in a client position, free from any real or potential threat from the provider. In such a case, information may have a profound impact on the behaviour of the receiving party, changing basically the premises of its decisions.

The production and submission of information is thus a critical function, aiming at changes in the premises for decisions, and in the consequent actions. This function is termed here informative criticism, as distinct from prescriptive criticism, aiming at a power position permitting the prescription of decisions by others.

Within an open organisation system, however, optimal use of policy instruments controlled by a sub-unit depends to a large extent on its willingness to receive relevant information, and to make it part of the premises for its decisions. What is often termed "institutional inertia" stems mainly from absence of motivation to do just this. Informative criticism, exerted both horizontally and vertically, is thus essential to the achievement of organisational goals through interplay between various sub-units.

The discretion of sub-units in exerting this form of authority should, therefore, be very wide, while authority exertion through prescription and bargaining must of necessity be kept within more restricted limits of discretion in order to ensure consistency in operational activities. Consequently, the range of discretion granted to a sub-unit is likely to be closely related to the proportion of operational activities among its functions.

Yet, even in the case of operational activities, a balance must be found between the need for consistency, as felt at the upper levels of decision-making, and the need for personal involvement based on actual participation in decisions, felt at all levels throughout the organisation. Also in this context, the emphasis on authority exertion through information is valid. Non-prescriptive information, passed "downwards" within an organisation structure, may to a significant extent take the place of the traditional, prescriptive forms of control, influencing the premises for decisions,

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(1) It might be argued that even prescription involves an element of negotiation, although from unequal bargaining positions.

(2) Unless in the case when the information, if also made available to outside parties, may weaken the bargaining position of the receiver.

but not limiting the range of discretion at lower levels(1). The role of informative criticism in a wider perspective is discussed below.

III. The Role of Informative Criticism

This emphasis on the production and dissemination of information points to an essential role to be played by such activities as research, development and planning. Being, at least in principle, detached from policy decisions, and operating frequently with analytical models broader than, or at least different from, the traditional models of hierarchical decision-making, they have an essential, critical function to perform.

The main consequence of the concept of authority defined here is, however, the legitimation, and the inclusion of critical functions into all organisation structures in society, both public and private. The idea of universities having a special critical function would, in fact, be meaningless if it did not relate to the creation and exercise of this function through the rest of society. The position of universities in this context requires further comment, which may illustrate the concepts of informative and prescriptive criticism.

Current criticism of the universities is partly based upon the claim that they fail to exert properly the authority actually assigned to them. In their own work, they do not use their freedom of choice to make them the institutional nucleus for critical analysis - the agents of change - which modern society needs so badly.

A new feature of the university situation is the bid by students for a share in decisions which up till now have been exclusively entrusted to researchers and teachers. To the extent the students succeed in this, two essential questions remain. Will such broadening of the participation in institutional decision-making really lead to a significant strengthening of the critical function of universities? And if so, should this be regarded as a reason for assigning more authority - and more resources - to such institutions, or less?

The latter question today emerges as one of the major issues both in education and research policy. As the answer is basically political, it is not pursued further here. The former question, however, has an important bearing upon this topic.

It is generally acknowledged that contemporary society changes at a previously unknown rate which requires a greatly increased adaptability to change. Current discussions on education are crowded with such statements. However, there is a tendency to forget that the ability to adapt pre-supposes motivation for change. Such motivation can only be based on the feeling that changes are under control, or at least somewhat influenced, by those affected. In education, therefore, it may be that there is not only a need to train

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(1) For educational policy, such a shift to non-prescriptive instruments is illustrated in my paper: "Financial Instruments and Efficiency Incentives in Educational Policy", published in "Systems Analysis, Programme Budgeting and Cost-Benefit Analysis in Education", OECD, 1968.

for adaptability, but also a need to train for mastering changes, and for initiating them.

Consequently, ability in critical analysis becomes essential. It is the basic prerequisite for participation in decisions. Agencies training for such analysis, and searching systematically for alternatives from which informed choices can be made, become nucleus institutions for controlled societal development. The role of educational institutions, and universities in particular, will have to be defined in such terms.

The critical function of universities, however, may be exerted in more than one way. Thus two main dangers seem inherent in the present struggle for change in the internal power structure of universities.

First, some groups apparently want to turn the universities into spearheads for an action-orientated critique of the present establishment, aiming, in fact, at a change in the general political power structure. The danger involved is, of course, that truly critical analysis will be subordinated to the main goal, the acquisition of political power. All empirical evidence points to the fact that prescriptive criticism, bidding for power, cannot be lastingly married to informative criticism, based on genuine critical analysis. The former tends to leave no scope for the latter.

Secondly, other groups, also devoted to critical analysis, apparently want to turn the universities into bulwarks for the defence of such analysis, isolating them from the dangerous influences of the surrounding society. Again, there is solid evidence about the likely outcome of such an attitude. If successful, it would make the universities a playground for internal quarrels, largely irrelevant from the outside world's viewpoint. The critical analysis of universities will be of no consequence, and they will represent no danger to any kind of establishment except their own.

The critical role of universities can only be effective under conditions differing radically from those outlined above. The critical function, in terms of unprejudiced analysis, the search for, and testing of, alternatives, and desire for change, must penetrate all sectors of society, public administration, systems of education and social services, and industry. This is the basic precondition if future developments are to be mastered.

In this context research as well as planning are change agents. The success of such functions can only be measured in terms of the performance of others. If planning activities do not result in changes in policy-making and in operational administrative practices, they have failed in their objectives. Correspondingly, if university research and training do not lead to changes in the behaviour of graduates in all sectors of society outside the universities, the critical role of universities is a fiction. This role, however, is one of informative and not prescriptive criticism.

To define the role of planning and research primarily as informative criticism does not relegate it to minor importance. Control of information is a key point of authority. Thus, only through the performance of this function can their full potential as change agents be realised.

While informative and prescriptive criticism cannot be the function of the same individual or institution at the same time, the two forms of criticism are complementary in society. The impact of informative criticism within a system depends to a great extent upon the existence of an outside, prescriptive, criticism. Correspondingly, if the proponents of prescriptive criticism succeed in overthrowing the existing political power structure, their chances of achieving their goals in terms of actual change are meagre, if they are not supported by a continuous, effective process of informative criticism. Historical evidence is more than ample at this point.

Today, this complementarity may be a basic issue. Countries permitting the interplay between these two forms of criticism may also be in a position to turn their internal conflicts into constructive incentives for development and controlled change. Countries without such an interplay may find real progress blocked by the opposing forces each fortifying traditional positions.

An essential task of policy is therefore to ensure that informative criticism can operate in different environments. The critical function becomes instrumental, representing an essential instrument for policy-making. It is, in fact, quite probable that the change in value structures wanted by anti-instrumentalists requires, to a large extent, the same policy measures as a more instrumental view on policy-making, based on the assumption that value structures are dynamic phenomena.

In this case, as in most fields of policy, it is a matter of striking a balance, the proper point of balance changing over time. This, as always, provides considerable room for conflict; the kind of conflict between collective and individual concerns which has characterised past centuries, and to which only tempory solutions can be found. However, today the desirable point of balance may be quite far removed from actual practice.

IV. The R and D Process

In the preceding chapters, it has been suggested that the performance of complex functions is best organised in "open" systems, where each function does not have a closely defined sub-goal. This implies the need for concern with the means not directly available to the function in question, as the achievement of relevant goals is dependent on the performance of a considerable number of other functions.

The interplay between such functions which is most likely to yield optimal results can best be achieved through the non-directive exchange of information. This process, called here informative criticism, makes it possible to change the decision-making premises of the receiver of information, as he does not have to resort to bargaining behaviour. This assumes however, that a considerable range of discretion be granted to those responsible for the performance of various functions, not only in the use of instrumentalities to achieve stated goals, but also interpreting the overall goal structure.

Such organisational characteristics, including a widened concept of authority, thus appear to be instrumental in that they are necessary conditions for both openness to change, and a deliberate search for better alternatives. The motivation for such attitudes, however, may also need an outside challenge in the form of what is here termed prescriptive criticism.

These conclusions have major consequences for the way in which reseach activities are viewed. From an instrumental point of view, research must eventually be judged by its consequences outside the research world(1). It is quite conceivable that the most desirable results will be achieved by more emphasis on fundamental research; but it is also possible that similar, or even better, results can be obtained through activities traditionally not regarded as research at all.

This situation is parallel to the one described for educational policy. Research policy may be defined in terms of the activities of specific institutions, identified a priori as research institutions. It may also be defined as activities undertaken in accordance with specific rules of behaviour. This definition would leave out certain activities of research institutions, but would allow the inclusion of some outside activities. Finally, it may be defined in terms of policies to promote the gaining of new insights, to which traditional research activities have a major contribution to offer, without in any sense monopolising the field.

The choice here depends on how one conceives the research and development process leading to change in society. According to frequently held views, new ideas generate in fundamental research; they are worked out within applied research; they are brought to a prototype stage and field tested in developmental activities, and then finally disseminated to practitioners on a broad scale.

It is doubtful, however, on empirical evidence, whether this linear hypothesis on the nature of the R and D process can be upheld. It seems that new insights are gained all along the line, including both practitioners and fundamental researchers, and that new impulses move freely between all elements of the process irrespective of the assumed "production line". Difference between the various elements should not, therefore, be thought of as reflecting different stages in a process; they seem to relate mainly to the orientation of the work - its goal structure - and to the adopted rules of performance established. All the elements involved are, in fact, engaged in a "search for truth", and there is no particular set of performance rules a priori more relevant than another. The key question is whether the rules applied are appropriate to the kind of questions asked.

In empirical research the concept of validity is essential. Validity requires replicability if findings are to form the basis for generalisations. The emphasis on validity leads quite naturally to a preference for measurable factors. Furthermore, in order to be

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(1) This also implies fundamental research, which is feeding primarily into the research sector itself, strengthens its capability for continued, increasingly relevant research.

able to draw upon established knowledge, a researcher is usually confined to operate within the theoretical structure of his own particular discipline. Breaking disciplinary border lines is still likely to provoke negative sanctions, and there are particular rewards for individual performance, both in research training and in later stages of the researcher's career.

As a consequence, traditional research projects tend to operate with thinking models which are handy, controllable and scientifically homogeneous in terms of the variables involved, but which, on the other hand, are extremely vulnerable to changes in external variables. This situation forms a parallel to the decision-making models illustrated in Chapter B. I. The thinking model of a researcher, consisting of the set of inter-related variables chosen for explicit examination, must satisfy similar criteria of autonomy. But the level of autonomy of such thinking models is frequently too low for meaningful generalisations to be made.

In applied research and in developmental activities, many of the traditional research rules are broken. Frequently, a much wider set of factors is involved, many of them not easily measurable, and their totality may be impossible to accommodate within the theoretical framework of any scientific discipline. Partial factor analysis is usually not possible, and factor interplay is badly controlled. If interesting results are obtained, they may be extremely difficult to trace back to the variation of any specific factor. As an experiment, the project is not replicable in any strict sense, and the validity of generalisation is doubtful.

Apparently, therefore, there is a situation where, at one end of a spectrum, valid answers to questions of limited relevance are given, and at the other end answers to pertinent questions with a low level of validity are given. This conclusion should, however, be questioned. When in a research project essential variables are excluded because they cannot easily be handled according to the conventional rules of research, are the findings really valid in any meaningful sense of the word? Have any meaningful aspects of "truth" been found in a partial consequence analysis completely leaving out far more essential consequences? Can one disregard the likelihood that such findings may be used as if they told the whole truth?

It is striking how often researchers, when presenting their findings, also add some guesswork as to what the findings might have been if other relevant factors were included, in order to arrive at some sort of meaningful generalisation. Such generalisations, however, may actually be less valid, even in the traditional sense of the word, than the results of purely developmental work.

Thus, the concepts of validity and relevance cannot be completely separated. In research policy terms they are intrinsically interwoven.

For research policy, the implication is that no element in the R and D process is a priori more essential than the others. It is also doubtful whether any part of the process can be regarded as more difficult, or as requiring more highly qualified people, than another.

However, a few established professions are involved in research; that of the academic research worker, that of the practitioner in the field, and that of the administrator. Each of these professions have well-established career patterns and clearly-defined performance criteria, and each operates within institutions adapted to its particular functions.

Other functions within the R and D process, such as applied research, developmental work, demonstration and dissemination, and to some extent planning, have no similar basis. They cannot shelter behind the walls of institutions particularly adapted to their functions. They cannot refer to clearly-defined and fully accepted performance criteria compatible with their particular tasks, and their career patterns often assume that really outstanding people eventually move on to other fields, especially within the established professions. Usually, they also lack the channels of influence on policy-making fought for and long since gained by the latter.

As a consequence, those new functions have difficulties in recruiting qualified people; they must fight for recognition of their professional role, they are constantly being judged on the basis of inappropriate performance criteria established by other functions; in short, their right to exist is constantly being questioned.

Thus, a key question in research policy is the professionalisation of new functions in the R and D process. This implies the definition and recognition of a differentiated set of performance criteria, and institutionalisation of new professional roles and career patterns. None of the functions involved in this process should be regarded as subservient to others, but a high degree of inter-dependence should be recognised.

This may, however, mean that professional roles in the traditional sense will have to be broken down as at present they limit the range of discretion which should be granted both to professional institutions and the individuals. Institutional roles should not be defined in terms of a strict division of labour, or of responsibility. Developmental activities, or even research, should not be excluded in an administrative or planning agency. Institutions for development work or applied research should not be prevented from occasionally approaching policy-making on the one hand or from picking up fundamental research issues on the other, if this is felt to serve institutional purposes. And there is no reason why universities should not get more involved, not only in applied research, but also in developmental activities. Such involvement would serve to vitalise their work in fundamental research, and even more their teaching activities.

The general orientation of the work in such institutions may vary, and will be based on the search for answers to different types of questions. How such answers are obtained, however, should not be restricted by formal limitations of institutional roles, or of the professional roles of individual performers.

This general principle should, however, be given an even wider application. The individual school, for instance, should also be offered opportunities for experiment and development work.

First, it should be granted considerable freedom to experiment with the composition of resource inputs within the limits of a given financial framework. In some countries today legal and financial regulations strictly define class size, hours taught per class, time spent on pedagogical guidance and supervision, the amount of remedial teaching, and expenditures on equipment and material. Means of control can, however, be found which secure a satisfactory level of performance, while leaving the school with considerable leeway in judging how available resources can best be used.

The essential point here is that each school will be faced with the challenge of thinking its own programme through, and be responsible for producing the best solutions. The experience and insights of headmasters, teachers and pupils may thus become available.

Experiment and development work often imply additional costs and additional efforts, at least in terms of preparatory work. Some countries have established systems whereby schools wanting to undertake such experiments may make proposals to a central body, outlining their ideas and specific schemes. The central body is then authorised to grant extra resources to the school in question, often so that personnel involved have reduced teaching obligations. At the same time, consultancy services on methodological questions are provided, evaluation mechanisms are developed, and a reporting system is established to secure the dissemination of interesting results to other schools.

Experience has shown that when such a mechanism for promoting experiments is established and well run, the majority of schools within a total school system can become involved in experiments as a result of their own deliberate choice. The outcome in terms of innovation may be considerable. The main result, however, may be a change of attitude, both within the school and in terms of outside expectations to the school community. To be "innovative" becomes one of the criteria of a "good" school, and ability to innovate becomes part of the self-image of the "good" teacher.

One essential consequence of such a change in attitude is a greater receptivity towards impulses from the outside, from other schools, from central development work and research. The feeling that one is "coping with change" and is actively participating in the change process provides greater security and makes defensive clinging to old behaviour patterns less necessary.

Freedom to experiment, granted to individual schools, should also apply to individual teachers and pupils. This will have to be arranged within the framework of the individual school, but central authorities may have to grant basic rights. Such rights are essential to the general change process within the school system, in serving as a means to break down the present hierarchical system of directive authority, and substituting for it a different form of multi-direction authority.

To a great extent, the means of achieving this are pedagogical and their rationale lies more in other political considerations than those of research policy. They are not outlined here.

The organisational structures indicated above have little in common with hierarchical systems with delegation of responsibility and authority for specific sub-goals to be served by each institution. Responsibilities are supposed to be shared, and institutional differentiation to be based mainly on the fact that different types of activities may require different kinds of institutional environment.

Correspondingly, responsibility for "policy instruments" is also shared, though certain types of instruments and competence are likely to be more frequent in some types of institutions than in others. This sharing, however, also implies opportunities for mutual exchange of services between different types of institutions.

The breakdown of strict professional role definitions should facilitate exchange of personnel between different functions. The policy task is primarily to ensure that some functions are not made disproportionately attractive and prestigeous, as are the traditional professions in this field.

If this hypothesis on how new insight is gained is valid, such guide-lines for action are instrumental in research policy terms. Therefore it may be concluded that a main purpose of research policy is to create and maintain new attitudes among performers throughout the spectrum from fundamental research to educational practice: a central concern of policy must then be the creation of environments which foster such attitudes, and which release human capacities for creativity and the critical search for alternatives, as a natural aspect of performer roles.

If this perspective be true, a concept such as fundamental research is only meaningful when defined in terms of the individual researcher's freedom of choice, not only in terms of interference from potential "users", but also in relation to the traditional behaviour patterns of research institutions. All research has a purpose: fundamental research is only distinguished by the degree to which the researcher himself defines this purpose(1).

The role left for a research policy on fundamental research is thus primarily to ensure that researchers have freedom of choice. This may call for serious consideration about the environmental conditions necessary for such freedom, since the present conditions are to a great extent determined by previous policies needing basic revision.

At the other end of the spectrum, individuals engaged in executive work must also operate in an environment encouraging active

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(1) It is, in any case, questionable whether any other definition of fundamental research can be made operational. The "objective" definition in terms of the eventual application of findings is hardly meaningful as the ex-post consequences may be unrelated to ex-ante expectations. The alternative would be to focus on the personal motivation of individual researchers. This is at best unoperational as there are no means of identifying such motivations. At best, one would only get a measure of the individual researcher's stretch of imagination.

search for alternatives to present practices. This implies continuous re-examination of current interpretations of organisational goal structures. Compared with research functions, there is a difference in terms of orientation towards specific goals to be served, and in terms of deadlines to be kept. The thinking models differ from those of researchers, especially those based on traditional disciplines, both in terms of the variables involved and the rules applied to their use. Yet, fundamentally, a somewhat similar attitude needs to be implied in executive roles as in researcher roles.

The differences, however, should not be underestimated, and it should be realised that they not only relate to different behaviour rules in the search for new insights. The need for research stems at least as much from the need for alternative value structures underlying this search, and from the belief that such alternatives are more easily developed within a research environment.

What is left for educational research policy, then, is not a proper field of policy, but rather a political purpose underlying educational policy as a whole. Institutions performing research functions, however defined, have their roles within a policy of this kind, as important contributors to informative criticism; interacting at the same time with other institutions within the general framework of research activities.

V. The Power Structure

In previous sections some of the concerns of public bodies responsible for educational research policy, and some of the criteria that should govern actual decisions in this field are outlined. It has been pointed out that perhaps the most essential task of research policy is the creation of environments in which R and D performance and interplay can be best achieved. Before going into these questions in more detail, however, some comments are necessary on another aspect of policy.

Public bodies are not alone in their concern with research policy. There exists in this field, as in all other areas of significance, a power structure, only informally related to the decision-making structure for public policy-making.

The following case illustration(1) is taken from the United States, where educational research has reached substantial dimensions, and where consequently the informal power structure in this field emerges more clearly than in many other countries. At the United States scale of operation, educational research policy has become an essential element in educational policy, constituting a key factor in changing the educational system of the country. Existing interest groups within the field of education and research cannot disregard it, and must take action to defend their interests.

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(1) This section owes much to the examination by the OECD of the United States educational research policy in 1969, though the interpretation of the current U.S. situation is solely the author's.

Central in this context are the power networks concerned with educational activities proper - representing the "school community". This part of the power structure primarily manifests itself through two different channels. One is the hierarchical structure of the school system, from teachers and principals to superindendants, school boards and other elected bodies dealing particularly with educational matters. The other is the teachers' organisations with their central representatives and their special lobby groups. These two power structures do not necessarily co-operate; on the contrary, none of them seems to be willing to accept the other as truly representative of the school community.

Closely linked to the school community are the university-based schools of education. Traditionally, their role has frequently been one of giving leadership to educational developments throughout the school system, and at least they command a key position in teacher training.

The schools of education, however, have a two-front battle to fight. They strive for full recognition as a respectable part of the university world, in spite of their lack of status and a traditional discipline base. The outcome of this battle is doubtful. The school community seems increasingly to resent leadership from the schools of education, while the study of education is still close to the bottom of the academic pecking order.

In recent years, researchers from discipline-based behavioural sciences, such as psychology, sociology, anthropology and economics, have increasingly engaged in research related to educational problems. Collaboration with schools of education has usually been limited and behavioural scientists are generally suspicious of the scholarly qualities of educational researchers.

Another group of discipline-based researchers also entering the field of education comes from the natural sciences. Their purpose, however, appears to be related to the belief that the way education is run affects the interests of their particular scientific fields. Reform of education is necessary to better science. Their involvement, therefore, has not primarily been research-based, but has aimed at a redefinition of basic educational goals. Typical of the activities of this "science policy" group in the educational field is the subject-based curriculum work undertaken by the National Science Foundation which is outside the educational policy-making structure.

Today, there may be a tendency towards an alliance between the "science policy" movement and the discipline-based, behavioural scientists involved in educational matters. This may mean the abandoning of the rather amateurish curriculum activities, the unifying concept being a strong focus on intellectualistic goals in educational activities.

Finally, through a deliberate effort made mainly by the federal government, a series of new institutions - regional educational laboratories, and R and D centres - has been established in recent years, mainly engaged on developmental activities, applied research and dissemination of research findings. This "in-between" group is resented by some university researchers, because it draws resources

away from their institutions and frequently disregards the criterion of "academic standards". They sometimes have managed to get along better with the school community, especially as represented by the formal hierarchical structure. But even there, tension is noticeable when real changes in the school system becomes the issue.

A recently-created, unstable research policy administration at the federal level is trying to find a basis upon which a rational research policy can be founded. Pressures from all the interest groups involved - through Congress, the Bureau of the Budget, the top political strata of the federal administration, and advisory panels - push this administration in all directions. Each time a reasonably consistent policy is being developed, it is immediately attacked from groups feeling that their interests are threatened, and their influence is usually big enough to prevent any consistency in policy implementation.

The obvious solution is to find means by which the various groups involved can establish a minimum platform for collaboration, such collaboration being clearly a necessary condition for the success of any policy for change. Each of the groups involved, however, tends at present to judge and reject the activities of other groups on its own performance standards. In this struggle for power, no formula for joined action seems to be obtainable.

However, such a gloomy situation is not the only conceivable consequence of pouring a substantial amount of money into educational research. The first condition for avoiding destructive in-fighting seems to be the need for an accepted public policy formulation. Then, it might be easier to obtain acceptance of a number of differentiated functions having a place in R and D activities. Competition for money will continue, and pressures will still be exerted through available channels, but the situation should be more manageable.

A precondition, however, is the development of an institutional framework and a career pattern sheltering the newer functions until they achieve sufficient strength to bargain on their own. Power structures always resist change, but are usually prepared to bargain when the changes are inevitable.

A key condition, therefore, is sufficient political strength to develop a balanced policy programme, and to ensure implementation without too much yielding to outside pressures. The programme should be formulated and implemented in contact with all the interested parties, but it should take its main guidelines from a general policy for education and research rather than from short-term possibilities of appeasement towards the most aggressive pressure groups.

A fashionable but much misused word in this context is "pluralism". With its positive value loading, this term is often used as as excuse for preventing public intervention in what is claimed to be the affairs of individual institutions or interest groups. If a positive value is attached usefully to the term pluralism, however, it must relate to the freedom of choice of the individual. This is certainly not secured by allowing special interest groups to exert their power without interference. On the contrary, they are often likely to impose much stricter regulations on individual behaviour than public policy bodies tend to do.

Previously, the importance of a wide range of discretion granted to institutions operating in this field has been emphasised. But the basic condition underlying this policy is that such institutions should operate in terms of informative criticism and not indoctrinate their members in a fight for power. Such conditions will not be achieved through a general policy of "laissez faire", or by creating some new institutions.

An active public policy may, in fact, have as its strongest rationale the need to ensure for each individual, whether in research or in executive functions, a creative and critical role based on the freedom to search for alternatives. Few of our countries today have an institutional structure ensuring such a freedom. It cannot be achieved without a carefully worked-out policy by responsible public bodies. Some of the means for working out such a policy have been indicated and in the final part of this paper this question, in the context of educational research, will be considered.

D. CONDITIONS AND INSTRUMENTS OF EDUCATIONAL RESEARCH POLICY

1. Present Conditions of Educational R and D

The hypothesis in this paper about the nature of the R and D process, and the views on research policy aims outlined above, already provide some indication of the proper instruments for educational research policy. The importance of the environment in which R and D functions are being performed has been emphasised and some of the elements that distort this environment at present have been indicated. A general change of attitudes as a basic aim of educational research policy, which points towards the recruitment and training of researchers as a key factor has been supported. Finally, the analysis may point towards some of the criteria which should govern the allocation of resources between individual projects and programmes in the field of educational research.

In this part, the current conditions of educational R and D, and the four main policy instruments in this field: organisation, recruitment, resource allocation and international collaboration are discussed in more detail.

The present conditions of educational R and D differ considerably from country to country. Certain features, however, seem to be common to most countries.

Compared with most other major fields of activity, R and D efforts constitute a tiny fraction of the total resources devoted to education. There is hardly a country where it amounts to as much as 0.5 per cent of public expenditure, the normal figure in most economically-developed countries being 0.1 to 0.2 per cent.

Mostly this goes into university-based research. A few countries, however, particularly the United States of America, the United Kingdom and Sweden, have recently put considerable effort into development work, and in the United States an institutional framework for such activities has been created. A few other countries have established special bodies for development and practical experiments in education.

Educational planning has expanded rapidly in recent years, and has become institutionalised in most countries. However, planning activities are still rather limited in scope; they are often badly integrated into the administrative structure, either only orientated towards providing a basis for top-level policy decisions or, in many cases, mere academic exercises. Only in a few countries has educational planning managed to establish a close interplay with operational activities.

At the universities, educational research is mainly concentrated in institutes for pedagogics, which draw to some extent on expertise in psychology, while contacts with other behavioural sciences are

rare. In sociology, economics and other fields, educational problems are taken up more or less accidentally, though the increasing interest in the sociology and economics of education is worth noting.

Educational problem areas subject to research at universities are usually rather narrow. University researchers often find it difficult to get into the real school world to make observations, and to the extent they are in a position to co-operate with special experimental schools, the laboratory situation rapidly becomes atypical.

As in most other social sciences, special research institutes outside the universities are rare in the field of education. When they exist, they seem to concentrate on testing and measurement services and other narrowly defined fields.

Contacts between educational research and administration are usually not well developed. The same is mostly true for contacts with educational practice. One of the reasons for this is the frequently quite weak link between existing research and the training of educational practitioners. In most European countries, primary school teachers are trained outside universities. Secondary school teachers, though trained in universities, often get a training which orient them more towards specific disciplines than towards the teaching profession. Educational problems as such play no major role in their university experience.

One reason for this may be the narrowly-defined problems dealt with by educational researchers. The teaching process is quite often conceived as a process of transmission from a teacher to a pupil. More recently, teaching material and equipment have been brought in as a third party. Also, when development work gets started, problems are usually narrowly defined, stated in terms of the production and field testing of "packages" of methods and material.

Quite often the findings of follow-up studies on the use of different alternatives of this kind are that they make very little difference. This may be because partial factor variations in such a complex process as education are quite unlikely to have an impact; the degree of autonomy is too low.

A typical example may be experiments with class size, which regularly seem to indicate that class-size variations alone have little impact. This, of course, cannot tell us what would happen if, for example, smaller classes were operated with methods and materials developed for such a teaching situation, with teachers trained for it; and with pupils used to it. There are some indications that the situation would then be quite different, but, of course, it is not possible to say exactly what factors cause the change. This kind of developmentally-orientated action research is also rare in academic research institutions, being frequently regarded as incompatible with their standards of "scientificness".

An even greater difficultly may be the lack of generally accepted evaluation criteria. In spite of the fact that everybody pays lip-service to the broad goals of educational activities, only narrowly specific aspects of their impact are usually measured. Most of the evaluation taking place gives the impression that

"achievement" in specific subject areas is the sole purpose of education.

The schools suffer from this gap between the stated goals and officially-recognised performance measures. Until now, educational research has done little to remedy this situation; on the contrary, because of its insistence upon "scientificness", it seems to have reinforced the most narrow concepts of what education is for.

Other research approaches to educational problems, based on specific discipline, have not contributed much to improvement. A typical case is the attempt of economists to tell what education should be like, if it were solely an instrument for the promotion of economic growth, as measured by the G.N.P. So far, this attempt of a rather meaningless partial analysis has resulted mainly in confusion, and increasing scepticism among educational practitioners as to the possible impact of research in education. Economics has certainly a role to play in the study of educational phenomena, but only as one of many instruments in a concerted analysis.

Role structure affects receptivity to research and development. A fairly general feature of educational systems is their authoritarian character. Directive authority is exerted downwards along hierarchical lines, and there is little encouragement of participation at lower levels. It makes no difference in this case whether systems are formally centralised or decentralised. Lack of central government influence may just as well leave the way open for strict authoritarian practices at the local government level or at the level of the individual school. The centralisation/decentralisation issue does not seem to explain the nature of the authority structure in the system as a whole.

An important factor in maintaining the present system is, in fact, the pressure from below, from the pupils themselves. Teachers, headmasters and local level officials often welcome authoritative directions from above as a reinforcement of their own authority, or at least as a defence against pressure from pupils and their parents. A basic change in the authority structure of the school system can, therefore, hardly be obtained without a change in this structure at the base level, which again implies a new concept of teaching.

This may be the most important reason why current research has such a small impact on educational practices. It does scratch the surface without reaching the vital problems of the educational process. And even when it goes deeper, role definitions throughout the educational system create resistance to the introduction of new findings.

Once more the general problem arises of creating changes in attitudes, which in educational policy terms means creating an environment in which such a change can take place. Unless active involvement in the search for alternatives to present practices becomes an essential part of the role expectations of performers at all levels in the educational system, the pupils certainly not excluded, no educational research policy has much chance of success.

II. Organisational Instruments in Educational Research Policy

(1) Organisational Structures of R and D Performance

In principle, the ideal institutional setting for R and D is one which facilitates "horizontal" contacts and interaction with other institutions working in related fields and on related problems. In education, close liaison should be maintained with research institutes in a wide range of related research fields, with school authorities, schools and teachers, with political bodies, economic institutions and other agencies working on relevant questions. Clearly, a choice will have to be made, a choice which will determine the place of the individual body within the network of different institutions.

External institutional relationships are main determinants of an institutional role. The traditional university institute is likely to have its main contacts with other university institutes, with university teaching functions - possibly also post-work retraining - and to some extent with outside institutes for applied research. Applied research institutes tend to have their prime contacts with more basic research within universities and with the training of school personnel, with institutions for development and dissemination, and with school authorities. Agencies for development work have to operate in close contact, both with individual schools and teachers, with dissemination centres and with educational authorities, maintaining at the same time professional liaison with applied and basic research institutes. Dissemination centres must draw upon research and development work, but operate primarily within the school system. The same applies to planning bodies, although their main emphasis will be on close collaboration with operational and decision-making administrative agencies.

A differentiated institutional structure, with varying role orientation and emphasis on specific R and D functions, but with no strict division of labour in functional terms is therefore required. Institutions could be grouped according to the predominant orientation of their work:

(a) Research/service institutions, closely linked to user organisations;

(b) Research/teaching institutions, usually inside universities;

(c) Research/application institutions, frequently organised as independent units, but often affiliated to a university milieu.

A considerable amount of overlapping between such institutional types is desirable. Teaching, especially at the post-graduate level, should be provided also by institutions of type (c), possibly even by those of type (a). Research orientated towards application may well be performed by university institutes, as well as by service-orientated agencies; while research-based service may be offered also outside institutions of type (c).

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Individual R and D performers should move easily between the different types of institutions, and thus ensure interchange of knowledge and ideas. This requires reciprocity of career patterns, to match the complementarity between the functions to be performed.

It is essential, however, that the performance criteria which govern the goal structure for institutions and individuals, should be appropriate to each of the functions in question. "Quality", both in terms of performance and personnel qualifications, should be judged in terms of the tasks at hand, and not, for example, in terms of traditional standards of academic research. The system of rewards and sanctions should not, in other words be allowed to restrict unduly the range of discretion.

This may make the exchange of personnel difficult, as long as the research career is dominant in prestige. In the long run, however, adequate career structures within each of its different functions are essential to the R and D process. This has been possible in such fields as industry, agriculture and medicine, and should not be beyond reach within education. Education may, in fact, be well placed to create institutional structures that provide precedents for R and D efforts in other fields, particularly those based on the social sciences.

Usually, educational R and D work requires inter-disciplinary staff. However, the essential question is how the interaction between staff members operates. Even in large research institutes most staff members may be working on individual projects, primarily to manifest personal qualifications through the satisfaction of conventional qualification criteria. Institute leadership may be limited to a few projects directly supervised by the institute head.

Four main types of activities can be distinguished for which the term "interdisciplinary collaboration" is being used(1).

(a) Research conducted within a common institutional framework by research workers trained in different disciplines, each working in his own discipline, but influenced by occasional contacts with colleages;

(b) A common research programme divided into sub-programmes, each based on a special discipline, the findings typically presented in separate chapters or volumes of a joint research report;

(c) A programme undertaken by an inter-disciplinary research team, working together and preparing joint reports;

(d) A situation in which the individual research worker has trained himself in more than one discipline, representing in himself inter-disciplinary competence.

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(1) This "typology" was first presented by Johan Galtung in "Om Fredsforskning", "Tidsskrift For Samfunnsforskning"1966.

The first three cases might possibly be termed inter-disciplinary, cross-disciplinary and multi-disciplinary research. In the fourth case a new research discipline has been created.

It seems clear that the closer an institution for educational R and D gets to the realities of the school system, the higher is the level of collaboration required between relevant disciplines. The limited thinking models of the traditional disciplines, with their low degree of autonomy, should not restrict the range of discretion in terms of the "instruments" used. Also within universities, however, there is a need for centres for multi-disciplinary educational research. This should not, of course, prevent other specialised institutes from approaching educational questions, when such questions form part of a broader set of problems, for example in the fields of sociology, economics, anthropology and medicine.

The differentiation of institutional roles also has implications for their financing, and the extent to which their activities are defined "from above". In principle, each institution might be financed through a "two-budget system".

A basic budget should provide the necessary nucleus of staff and the institutional infrastructure. It should also allow the institution to build up competence in its particular tasks as it thinks best. Furthermore, an operational programme should be financed through this basic budget and its size determined according to a general judgement of the institution's functions and performance, but not on the particular project proposals.

On top of this, contract financing should permit the full utilisation of the institutional nucleus, each contract being concluded after negotiations between bodies responsible for financing and the institution itself. The initiative would frequently be taken by the research institution which, on the other hand, should have the freedom to refuse contracts offered.

The balance between the basic budget and the contract financed part would vary from one institution to another. For university institutes, the contract part may be very small or even zero. In general, the performance of an institution should not be judged solely by their ability to attract contracts. If more than lip-service is paid to the basic critical function of such institutions, their freedom of action should not be strictly limited to their ability at any time to convince potential users of the value of their work.

(2) <u>The Organisational Superstructure</u>

The development of an appropriate organisational framework for educational research is thus intimately connected with such issues of research policy as breaking down rigid university structures, developing multi-disciplinary institutions for applied research and development, bridging the gap between research inside and outside universities, balancing the attraction of functionally different types of institutions for research and development, and creating differentiated performance standards appropriate to the various institutional functions. It is obviously difficult for educational research policy to move on its own without major reforms in the whole

field of research organisation. On the other hand, educational research, if properly backed by one of the biggest industries in all our countries - education - may well be placed for pioneering efforts in this field. The organisational principles followed in this area should, therefore, be carefully chosen with a view also to the need for a more general restructuring of research organisation.

Organisational measures in research policy, however, are not restricted to the internal and external relationships of individual institutes. The organisational superstructure, including the distribution of responsibility for research financing, should be restructured according to similar principles. Typical elements of this superstructure consist of university faculties and central boards, research councils and agencies for funding of research inside central government administration.

The organisational superstructure within universities can hardly be changed, except as part of a major university reform. In the long run, the prime aim of educational research policy must be to establish an accepted pattern of outside research contracts, possibly also for development work, to individual university institutes and researchers. This would make it possible to get round the rigidities of financial allocations within a university. It might facilitate the broadening of multi-disciplinary contacts and the development of more appropriately-sized research programmes, and it might promote closer contacts between university research and users outside the universities. The ties of university traditions on individual discretion may thus be slackened, while the typical goal structure of university research is likely to be maintained. An essential reason for widening the scope of university research institutes in this way is also to increase their chances of providing adequate training of new research workers.

The outlook of research councils' research policy may vary considerably. Councils mainly concerned with fundamental research are hardly in a position to develop comprehensive strategies for educational research policy. This may also apply to councils mainly responsible for promoting the social sciences; partly because their discipline orientation constitutes a limitation, and partly because they tend to be dominated by academic research interests.

In this case also, the short-term policy must be to accept the particular goal structure of existing research councils, and to adapt the role assigned to them consequently. Traditional rigidities in terms of funds allocation might to some extent be overcome through specific grants to such councils, earmarked for educational research. Yet, it would be difficult for these institutions to adopt in one specific area of research a policy outlook fundamentally different from that governing their policies in general.

Specific bodies for the promotion of educational development have been established in a few countries. Such bodies are usually strongly involved in operational activities, and it seems doubtful whether they should at the same time be responsible for extensive funding of research outside their own control. This should not, of course, prevent such institutions from contracting out certain parts of their own programme.

Specific councils for educational research may be the most appropriate bodies for the development of a strategy for educational research in general. There is, however, the danger that such councils will be more concerned with the short-term feasibility of projects than with their relevance to educational goals. Furthermore, educational research policy is an increasingly important instrument for educational policy in general. One can easily unders and the reasons why ministers of education may want to avoid responsibility for priority decisions in the field of research. However, strategic decisions of this type are essential to educational policy, and should not be left to bodies which may lack intimate knowledge of, or interest in, current policy issues, as well as political responsibility.

Another possible solution is to build an agency for research policy and funding of research within the Ministry of Education. Such an agency might well be guided by an advisory body, but the responsibility for strategic decisions would rest with the Ministry. The agency would have to find a balance between earmarked appropriations to existing general research councils and operational bodies for educational development, and research contracts for institutes and research groups within and outside the universities.

This may point towards differentiated responsibility for research funding. The universities and other established institutions would allocate money to educational research according to their usual principles of allocation. The same would apply to research councils, which may also have additional earmarked appropriations to spend according to their own outlook on educational research policy. Developmental bodies will get activities funded on the basis of specified budget proposals. On top of this, research contracts for priority tasks would be offered by a central ministerial agency for educational research to whatever institution seems appropriate, while the responsibility for the main lines of policy rests with the Ministry of Education.

As seen from institutions performing educational R and D, such a superstructure offers a wide range of options in terms of the goal structures governing the allocation of funds. Thus, their range of discretion will not be too restricted in terms of conceptions of their critical functions.

As a general system, this may well be applicable to more fields than education, and might indicate a general pattern for the organisation of applied research in fields of major public interest.

III. Research Recruitment Policies

Research recruitment policies are closely linked to organisational measures, and to questions concerning resource allocation. Yet, as they are an essential instrument for research policy, some special points concerning recruitment are taken up in this chapter.

There are two main aspects of the recruitment of researchers, one relating to the training of new researchers, and the other to the possibilities of attracting trained personnel from other fields of activity. The possible need for retraining of the latter category causes some overlapping between these two aspects, but it may still be convenient to deal with them separately.

(1) Training of New R and D Performers

An organisational framework, covering the range from research to operational activities, performs a series of different functions. The development of correspondingly differentiated professional roles is a precondition for the effective interplay between those functions. In developing these roles, adequate training of personnel is essential.

In most countries, the training of personnel in this area follows three traditional courses, directed towards research careers, administration or educational practice. This divisiveness in training is often reinforced by the lack of contact between university education and applied research. Applied research institutes, usually located outside the universities, are often not able to influence the training of their own future recruits, and even less of staff for other functions.

Functions related to development work thus lack adequate personnel training. There are three remedies which should all be persued - through long-term changes in the traditional training system, through internal retraining of personnel with inadequate training, and through balancing the staff composition of institutions in charge of new functions.

Existing educational research institutions are usually not well suited to training a multi-disciplinary research staff. Institutions not concerned primarily with educational research may not be interested or qualified for the training of research recruits in fields related to educational questions. The development of special research groups in such areas as educational psychology, educational sociology, educational economics, educational anthropology, educational administration, and educational technology, inside such discipline-based institutes as those for psychology, sociology, economics, etc., may not be an ideal organisational solution from the point of view of educational research. It may, however, be necessary in order to establish a sufficiently broad multi-disciplinary recruitment basis for educational research, until expanding research centres have acquired sufficient strength to offer adequate training in more specialised areas.

Perhaps more difficult is the question of finding an appropriate balance in research training between various types of research and development work. Most research training goes on in university institutions mainly concerned with traditional research. Broadening the scope of their research activities, both in terms of more appropriate research programmes and in terms of more differentiated types of research, seems imperative if the universities are to maintain their position as the prime suppliers of trained researchers. However, through collaboration with outside institutes for applied research and development, a more balanced programme of training could be developed, if research programmes of such institutions were systematically used as a training ground for new researchers, possibly under the supervision of university authorities responsible for research training.

This kind of collaboration has been achieved in other fields of research, and common benefits for all parties might bring it nearer to educational research. The danger is that academic institutions might fear that, by losing their monopoly of research training, their ability to select the best candidates will be reduced. As this is obviously a main purpose behind such a redistribution of training responsibilities, some friction may result.

The established set of criteria for research training constitutes another obstacle for balanced recruitment. Traditionally, researchers are required to carry out their apprenticeship under conditions which are at odds with the requirements of their research career. Work in isolation - on often rather artificial one-man projects - is certainly not the best way of training people for future activities within research teams, working on major programmes, and possibly emphasising the developmental aspects of their work. A basic change in this general feature of research recruitment policies can hardly be obtained by educational research policy alone. But attempts should be made towards modifying some of the worst rigidities of the present system.

Perhaps the gravest difficulty in research recruitment is the tendency for vested research interest in certain fields to attract also most of the new research workers, thus creating a cumulative imbalance. This is partly due to the simple fact that established research milieus and programmes have also the necessary capacity for training the new research workers. Furthermore, established patterns of research offer more security in a still rather risky research career. Finally, strong research personalities within an existing milieu naturally tend to attract the best recruits to the field of their special interest.

The allocation of recruitment possibilities is a main research policy instrument. Training capacity must be created in initially weak fields of great relevance, while recruitment capacity may have to be restricted in well-established areas of less relevance. Training fellowships should be at the disposal of non-university institutions, and training should be regarded as one of their necessary functions. Clear statements on policy interest in expanding areas may increase the motivation of researchers for work in such fields.

The isolation of universities from applied research and development work is also harmful to training for traditional administrative careers and for educational practitioners. Research findings and training in the form of general principles, apparently far removed from the practical problems facing administrators and practitioners in the field, are frequently all the universities have to offer. In many countries it is quite conceivable that university graduates have not had any chance of getting acquainted with the kind of research that really faces the problems connected with their future work. No wonder that their general attitude is frequently one of disregard for research as a factor relevant to their practical tasks. This situation, too, calls for extensive collaboration between universities and outside bodies in the training of students, both for future research careers and for those of professional practitioners.

In all relevant training, the orientation of the training itself is a decisive factor. Its aim should be to provide its students with both the instrumentalities and the motivation for continuous efforts to improve conditions in their particular fields of activity, in the perspective of more general goals. Existing structures of "professional" values should be examined critically, and the inherent value orientation of current professional practices should be made explicit. The teaching itself should be free from directive authority, reflecting an educational milieu in which authority is exerted in all directions, through the active participation of all its members.

Such a training situation is not easily achieved by political means only, and it can hardly emerge from an educational system dominated by other, more traditional, authority characteristics. Training for the constructive participation in educational milieus free from directive authority should, in fact, begin in the primary school and within the family.

A deliberate policy of decentralisation in decision-making, through a shift towards informative means of authority exertion, may constitute one step towards breaking the vicious circle. Essential to this policy, however, is the effective implementation of such a shift at all levels, "down" to the individual teacher and pupil. The loss of prescriptive authority at the top must not be permitted to result in its revival at some intermediate level. Legal instruments may be necessary to ensure increased discretion of the individual within the system, and an active policy will in any case be called upon to break down the authority structures currently imbedded in the system.

Such policies are profoundly dependent upon general public support, which may not prove easy to achieve. However, recent reactions among young people may serve as an essential reinforcement in this case. An educational situation should be created in which pupils and students can develop their own interpretation of societal goals, and of educational requirements, without necessarily feeling that it is a revolt against the system as a whole. Such a development should quite, on the contrary, be regarded as an essential part of their experience in any educational situation.

The question of the professional composition of new recruits should be watched carefully. The innate tendency for all groups to recruit from their own discipline must in some way be broken. The example of educational planning is here significant. There are ample examples of planning groups drawing exclusively upon the findings of one particular field of research and neglecting completely essential information emerging from others. The resulting analysis shows all the weaknesses of discipline-based research, frequently, however, without the caution shown by the latter.

This is not, however, only a question of a truly multi-disciplinary composition of R and D staff. A diversification in experience and milieu background is also desirable. When a group consisting solely of researchers tries to work closely with a traditional administrative organisation, there is a great risk that such a group will find communication difficult. As a consequence, the group may tend to address itself mainly to its own professional kind, thus

reinforcing its isolation from the administrative organisation, and distorting the purpose of its activities.

Similar effects are also sometimes seen when a group with predominantly administrative background enters a borderline field of research. Facing negative reactions among researchers, they may turn primarily to their own professional groups, thus failing to achieve their initial purpose.

Ideally, groups should be recruited not only from different professional fields, but also from different work milieus, establishing in this way effective communication links with related functions. Again, the question of exchange of personnel between different functions is vital.

Also in the case of staff composition and interaction, the principle of non-directive authority is decisive in creating a milieu conducive to informative criticism. Individual discretion, based on genuine participation in decision-making, would then mainly be limited by the requirements of team-work.

(2) Attracting Personnel from Other Fields

In many countries, educational R and D work is in a period of rapid relative expansion. This in itself creates substantial difficulties for recruitment. One of the problems is to find the right balance between the use of existing qualified personnel resources for the training of new recruits, as opposed to their full utilisation in operational R and D work.

Under the present rules for research qualifications, this difficulty is real. Qualification requirements, for example, for a Ph.D., are often such as to make research trainees rather ineffective in terms of actual research performance, and yet dependent on a considerable amount of supervision by qualified research staff. Research training, more relevant to the future work of R and D performance, would imply that at a very early stage, new recruits are engaged in team-work on essential research and development projects, contributing in a real sense to the total performance of the team.

Expansion of university activities to include larger applied research and development projects might facilitate a development in this direction and, in some countries, there may also be a tendency towards abandoning some of the most irrational criteria for research qualification. Yet, this is a long-term perspective, and can only partly remedy the immediate personnel crisis of rapidly expanding educational R and D activities. The training of new researchers is in any case a time-consuming process, and in the long run, one will have to look for other supplementary measures.

Attracting active research workers from neighbouring fields has a much more rapid effect, and may also help to create better contacts with current research not primarily orientated towards education.

Perhaps even more important is the possibility of attracting people involved in educational activities outside the field of research. This applies particularly to development work, where

qualification needs are more flexible. The experience of educational practitioners is also of particular value for such activities. Specific training courses in research technology might facilitate the recruitment of such personnel also for research purposes.

A number of practical measures may facilitate the transfer of personnel from other fields. The most important factor, however, appears to be the creation of a lively intellectual milieu around educational research and development. There are complaints made today about the difficulty of finding high-quality recruits for educational R and D. In a number of countries, where significant efforts have been made, however, active and expanding research milieus have considerable attraction, both to researchers and practitioners, especially when a country is in the middle of major educational reforms.

The distinction between research and development on the one hand, and operational and administrative functions on the other, is becoming increasingly blurred. Such functions as planning, field experiments, field testing and dissemination of research findings play an increasing role in the general running of school systems. It would be valuable if persons engaged in such activities could have the opportunity of spending some time directly involved in research and development activities. They have a background of experience which might be highly appropriate to such activities, and they may gain new insights of the utmost value for their practical work. Correspondingly, research and development personnel could gain valuable experience by temporary assignments to more practical tasks within the school system. A systematic scheme for personnel exchange, involving both administrators at various levels, information personnel and teachers on the one hand, and researchers on the other, might become a key instrument of educational research policy.

In some countries, such systems of personnel exchange have long traditions in the field of agriculture, primarily involving scientists, teachers and extension service personnel. A similar, though less systematic, exchange takes place in the industrial sector. It would be desirable if a corresponding system in education were part of a more general system involving all public services. The educational sector, however, should be well placed to lead the way in this respect.

IV. Resource Allocation in Educational Research Policy

The two basic criteria for evaluating a research project are the relevance and the feasibility of the project. One might say that, to a great extent, research policy consists of making relevant research feasible.

The relevance of a project is judged on the basis of policy aims. Such aims might include increased basic knowledge in a field of research or more effective training of future research workers, as well as the potential impact upon goals outside the field of research.

The feasibility of a project depends upon the interplay between ambitions and resources of the researcher(s). Resources are here taken to imply both material resources, available methods and the

present state of theory building in the areas concerned, as well as the personal qualifications of the researchers involved.

In the short run, research policy must emphasise the feasibility of potential projects, beyond the financial resources needed. In a somewhat longer perspective, the relevance of projects can be given more weight, as feasibility conditions may be improved through a deliberate research policy.

The first condition of project feasibility is, of course, the provision of the financial resources needed. Research policy in many fields has not yet reached far beyond this point, which means that short-term, feasibility-based considerations dominate research priorities. Thus well-established research sectors tend to be developed further, while neglected areas remain undeveloped, quite irrespective of their relevance. More long-term policy instruments for increased feasibility, such as organisational measures, recruitment programmes for research, and international collaboration, which in the long run are decisive for the relevance of the total research effort, tend to be neglected.

(1) The Relevance of R and D Projects

The relevance of a project should be evaluated on its expected impact in all potential fields of application, including the field of research itself. Education serves a large number of objectives and, at the same time, a wide range of different resources are fed into the educational process. The total interplay between these "inputs" and "outputs" is extremely complicated.

In analysing such a system, a not unusual simplification is to separate the so-called "external" and "internal" variables. "External" variables would include such factors as those connected with the inflow into the educational system and the demand for output from the system, while "internal" variables would refer to factors describing the system "as such".

Such a distinction, however, is not very meaningful. The inflow into the educational system at various levels has a decisive influence upon "internal" variables at those levels, while such variables themselves have a strong impact upon the inflow. In the same way, "internal" variables are heavily dependent upon the demand for educational "products", while this demand is strongly influenced by "internal" factors. It is, therefore, an illusion to think that "internal" factors can be evaluated unless in relation to "external" variables. Nor can "external" variables be regarded as autonomous, since they are profoundly influenced by the system as such. "Internal" and "external" factors can only be dealt with properly in a simultaneous analysis.

Most "external" factors, such as inflow and demand for educational products, are mutually dependent, and this is also true for a great part of the "internal" variables. There is reason to believe that partial variations of individual factors in the educational process will mostly "prove" that no really significant changes are possible in education.

This conclusion is certainly not justified. Yet, the complexity of the interdependence between most relevant variables in the educational system supports the view that only projects taking a large number of variables into account can provide valid results. Only when a series of factors is varied at the same time can more significant changes in the educational process be expected.

If this were true, far-reaching consequences for the ways in which educational research is carried out would follow. Team-work and comprehensive, co-ordinated research programmes would be the obvious solution. Relevant research training would have to find its place within such a framework. Tendencies in these directions are, in fact, noticeable in countries pursuing an active policy of educational research, such as the United States, Sweden and the United Kingdom.

Such assumptions also have a profound impact upon the relevance of various projects. Within a system of strongly interdependent variables, each factor may in a given situation operate as a minimum factor - a "bottleneck". It would not be possible a priori to attach particular importance to any specific factor within the system, nor to the study of such particular factors.

As an example, it is interesting to note that experiments recently started on the interaction between teachers, pupils and new devices for individualised teaching, such as computers or other types of teaching machines, rarely take into account the potential implications for pupil interaction. This is so much more strange, as the most extensive study on pupil achievement ever undertaken, the "Coleman Report", points to this interaction as possibly the only major internal school factor influencing achievement. This might indicate that a great part of current research on individualised instruction is another case of projects with a too low degree of autonomy in their underlying models.

The complexity of the relevant factors involved may also be one of the reasons why in educational research, so few examples are found of genuine experiments with different power structures within schools(1). In view of recent educational developments, one might suspect factors of real importance to be connected with such structures, but as yet, the field has mainly been left to a number of developmental projects.

The various R and D functions must be viewed in a similar perspective. The differences between them are partly found in the way they are performed, which again may influence the relevance of their results.

A researcher who wants to be accepted will tend to impose upon his work a series of constraints concerning the quantifiability of variables, the "quality" of available information, the possibility of "control" of relevant variables, the existence of relevant general theories within his branch of research and so on. He will also adhere to a number of conventional rules about research procedure,

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(1) The extensive research on "teaching styles" has some relevance in this context, but does rarely raise the full issue.

manners of presentation, and formal qualifications of participants in the study. Such constraints may differ somewhat from one field of research to another, and between different research milieus. Some of the existing conventions are also questioned, by researchers themselves, as to their relevance for the purpose of gaining new insights(1). Yet, the validity of the findings is still a main concern of the researcher.

Another feature of research, distinguishing it from other R and D functions, is the frequent lack of defined objectives implicit in the researchers' thinking models. While goal-oriented (applied) research is characterised by the explicit definition of such variables, "pure" (fundamental) research does not a priori attach normative qualities to any set of variables(2).

Another difference, sometimes wrongly interpreted in terms of integrity, lies in the thinking models used. R and D performers oriented towards practical work will tend to start from existing problems and policy-oriented models, examine their validity, and expand them in order to increase their autonomy. Researchers, on the other hand, will tend to use models based on scientific theories, frequently covering far more ground than the actual problems at hand, but not always fully relevant to those problems. This difference in approach often makes it possible for researchers to reveal relationships not too easily identified by other R and D performers, while the latter may be in a better position to judge the relevance of their thinking models.

Such differences might explain why research, neither in a historical perspective, nor under present circumstances, is the sole generator of new insights. Whether we use such terms as "innovation", "development", "planning", "inquiry", "creativity", new insights are gained in all fields of society, in work as well as outside the sphere of economic activities. What characterises a modern society is not primarily its emphasis on research, but the extent of interplay between research and innovational activities in all sectors of society.

The generation of new knowledge - "the search for truth" - is inevitably a two-dimensional concept, based both on the validity and the relevance of new findings. The two dimensions are closely interrelated, as far as the validity of a theory is judged by its

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(1) Cfr. for example the growing interest in "action research".

(2) In all likelihood, this represents a gross over-simplification. In terms of the researchers' subjective evaluation, normative qualities certainly play a role, also in pure research, both in the choice of variables to be included in the model, and in the selection of dependent variables to be "explained". A more realistic distinction, therefore, between pure and goal-oriented research might, perhaps, be made in terms of the degree of general acceptance of the normative qualities of dependent variables, even outside the world of research, although such a distinction could hardly be made operational.

"explanatory" value. Validity is then largely a question of the autonomy of the thinking models used, which again is an important aspect of the relevance dimension. Thus, neither validity nor relevance are stable measures; they change with time and circumstances. The view often held is that relevance, as opposed to validity, has a short life span. In principle, however, there is no clear distinction between validity and relevance in terms of their resistance towards changing circumstances.

On the other hand, the typical emphasis of researchers on validity, and that of other R and D performers on relevance makes a strong case for close interplay between the various functions. Without such an interplay, research will become remote and the other R and D functions become ritualised and sterile and fail to perform their basic critical function.

The problem is to what extent it is possible within the educational system to find sub-systems with a fairly high degree of autonomy, where inter-relationships between variables within the sub-system are relatively insensitive to changes in outside variables. To the extent such sub-systems are found, research models can provide valid conclusions. In view of the extremely daring autonomy assumptions frequently implied in research in most other fields, educational research may also find a scope for projects smaller than those attempting to embrace the whole of the educational process. Even in this area, there may be some reason to hope that the systematic collection of <u>half-truths</u> might eventually lead us closer to the truth.

In all likelihood, however, increased knowledge about the educational system will, even in the future, primarily emerge from practical experiments and other development work. In education, as in industry, development aims at the creation and testing of prototypes. The practical evaluation criterion is that the prototype functions equally well or even better than what has been used up till now. This means accepting for the evaluation of the prototype the same simple criteria which are normally applied in practice.

It is desirable to make follow-up studies to clarify the full consequences of introducing a new prototype, and also to examine the possible consequences of alternative prototypes. However, as long as we know as little as we do today about the real consequences of current educational practices, it seems rather meaningless to impose upon most development work such strict evaluation criteria. A misplaced "scientific" attitude would certainly kill most development activities in education, as in other areas, and would in its logical consequence lead to the abandonment of all educational activities until we know much more about what we are doing.

Again, we may conclude that in the search for relevant R and D projects, there is no a priori basis for regarding a particular R and D function as more productive, or more worthy of support, than the others. Other criteria than the labels of "fundamental research", "applied research", and "development", must be applied. There are some reasons to prefer major programmes, embracing a large number of variables, which in many cases points towards developmental activities. This should not, however, be interpreted to the extreme that no room is left for smaller, frequently more research-oriented

projects. Interplay between various R and D functions is essential. One cannot, however, judge the performance of one function by the criteria of another, without the risk of destroying the proper functioning of the former.

(2) Approaches towards Increased Relevance

Turning now to a more specific discussion of relevant research projects in education, the first suggestion is that there is still an extensive need for descriptive observation of central variables in the educational process, factors of psychological, sociological and economic character. This raises, however, the question of the relative "importance" of such factors.

A starting point could be the costs connected with the input of various factors. This is not very satisfactory, as a far more important criterion would be the impact, in a given situation, of a marginal change in the input of each factor upon educational goals. However, on the whole, only guesses can be made on this part.

Where factor costs have been chosen to illustrate an approach to the question of priorities, it should be stressed that this is only one of several ways of viewing the problem. This is perhaps a somewhat unusual angle, but as it is relevant to practical policies, the example is still of interest.

The input of pupils' time is the dominant cost item in major parts of the educational system. Variables relating to the pupils should therefore be very significant.

(i) Pupil Input

There is reason to believe that the behaviour of pupils in the educational process is related to their social and economic background, their abilities and other psychological characteristics, and their experience at earlier stages in the school system. Such characteristics have not been very much observed in the various types of education. Even weaker is knowledge about the correlation between such variables and actual pupil behaviour within the educational system, for instance related to the transfer between various levels of education and achievements in school requirements. Moreover, very little is known about correlations with behaviour not regularly evaluated in a school situation, although constituting important elements of any statement on educational goals.

There is some information about what happens to the "output" of education, mainly in terms of occupational careers. But the functioning of graduates in working situations, and their functioning in other contexts are very little understood. Similarly, little is known about how the differences in functioning relate to pupil characteristics brought into the school system, or acquired during the educational process.

Essential issues in educational policy depend upon questions of this type. But even a careful observation of such factors would lead only part of the way to valid conclusions. Partial analysis of individual factors may easily be misleading, and even more comprehensive factor analysis can point towards conclusions which may

prove to be very sensitive towards changes in variables external to such a model, for instance educational methods and content.

(ii) Other Cost Items

Similar surveys are needed of other costly resources in education, such as teachers, other manpower, equipment and teaching aids, and school buildings. It seems to be widely believed that with teaching aids, especially, a marginal increase in costs might lead to major advances in terms of educational objectives.

This may also be true for such less cost-requiring factors as organisational and informative inputs. Something is known about the organisation of education and the content of the curriculum, but the actual situation regarding the use of instructional methods and the character of interpersonal relationships in the educational process is largely unknown. Costs related to such factors mainly take the form of expenditure for research and development, for training and retraining of teachers and other dissemination of information to the schools. The view is not uncommonly held that in these cases too, a marginal increase in inputs may yield major results.

(iii) Educational Goals

Another type of survey concerns the goals of education - as conceived by educational authorities, teachers, pupils and parents, and as emerging from the actual behaviour of the different groups.

Essential in this context is the present lack of adequate instruments for measuring the extent to which various goals are actually reached within the educational system. We have only to a small extent been able to define generally-accepted or potential goals operationally. Even purely descriptive research in this field seems seriously neglected.

The "importance" of various goals of education will influence also the choice of projects in this area. Guessing, on the basis of the scattered pieces of insight available, will have to be resorted to.

It might be added that the question of the importance of various goals should not be thought of in purely normative terms. Education has no goals "per se". The various elements of an educational goal structure are justified by their relationships to more general goals of society, and the validity of such postulated relationships should, at least in principle, be accessible for empirical verification.

(iv) Priority Assessment

General ignorance about the educational system justifies a high priority for descriptive studies of phenomena related to the most important input factors in the educational system. The most essential questions in education, however, cannot be fully answered in this way. Such answers would require a much deeper insight into the interrelationship between inputs and goals than descriptive studies of this type can provide.

A step towards broader problems may be represented by studies concerning the possibilities for substitution between various inputs into education. One would then at least approach some of the strategic choices which have to be made in connection with the further development of the educational system. Some such questions of priority are indicated below.

Allocation of teacher input. Available teacher resources can be used in various ways. Would the best results be obtained by (a) more time spent in school by pupils, (b) reduced normal class size, (c) more frequent splitting up of classes, (d) more emphasis on remedial teaching, (e) more teacher time spent for joint planning, information retraining and so on? Would a re-allocation in relation to current practices give a better utilisation?

Teacher input/other resources. Can teacher input partly be substituted for by other resources, such as teaching aids, other types of manpower, self-controlled pupil work, and other principles for organising instruction?

Current/capital expenses. To what extent is rational instruction dependent upon the type of school buildings available? How valid are the suggestions that new types of school buildings are a necessary condition for more basic reforms in education? What additional costs of school building permit a greater flexibility in educational practices?

Pupils' time/other resources. Can the same educational achievements be obtained in a shorter time by increased input of other resources, such as teachers, teaching aids, new organisational structures and new teaching methods?

Alternative instruments in the selection process. What are the results of such measures as pre-school teaching, abolition of organisational differentiation, reduced distance to school, guidance and various forms of financial aid, for the application and completion of education at various levels?

Alternative weights on various forms of teaching. What are the results and economic consequences of different combinations of in-school and out-of-school education?

Alternative weights on various forms of education. Have we arrived at a proper balance between basic education and adult education on the job or in spare time? Would our total educational efforts show better results if resources were re-allocated between those forms of education.

Alternative weights on different types of pupils. What is the impact of educational efforts aiming at pupils with different mental and social characteristics? How much of so-called "educational achievement" is, in fact, a mere reflection of the pre-selection of pupils? Is it possible to judge what kind of pupils would be most "profitable" for educational efforts?

Alternative weights on different educational goals. What is the impact upon the personal development of pupils and other general objectives of society of such elements in educational goal structures as the acquisition of concrete knowledge, problem-solving abilities, openness and tolerance, ability for co-operation, creativity, etc.

It seems quite clear that practical questions such as these cannot easily be transformed into fruitful questions for research. The factors involved are difficult to define, and offer complicated problems of empirical measurement. At the same time the degree of autonomy would often be low. Answers which might be found will obviously in many cases be sensitive to "external" factors, such as structures of authority and organisational roles, instructional methods, teacher experience, curriculum content, pupil characteristics, etc. The weighing of various components of the goal structure for education will be decisive all through.

Even such fairly extensive "models" as represented by the questions raised above would, consequently, in many cases not be sufficient to provide scientifically-based answers. Projects aiming at throwing some light upon questions of this type will mostly have to be developmental in character - testing out alternatives constructed on a partly intuitive basis, and evaluated according to the simple criteria of everyday practice.

A main weakness in this cost-based approach to the question of project relevance is that alternative solutions to many essential problems in education are not fully reflected in cost figures. This is true for problems related to educational content and methods, and it is also largely the case regarding alternative models for participation in decision-making in education at different levels.

A full appreciation of the relevance of research relating to such problems is only possible with reference to a defined goal-structure for educational policy. However, though tempting, a major discussion of goal structures and possible uniform traits in such structures from country to country is beyond the scope of this paper.

Yet, it should not be forgotten that educational research policy is basically a matter of politics, of applying normative criteria to essential decisions. To some extent, differences in normative judgement may be due to lacking factual information about empirical relationships between ends and means. Yet, there is no doubt that genuinely different value structures exist, which have a substantial bearing upon educational policy. This is true when comparing different countries, as well as within each country.

There may be a tendency for international organisations, and even for national authorities, to disguise such differences for the

benefit of apparent collaborations, both internationally and between different interest groups. The study of educational research policy should perhaps rather have as a primate purpose a more explicit exposure of different value structures relevant to educational policy, and of their consequences in terms of practical policy measures.

Precise and "operational" statements on goal structures are difficult to obtain from responsible authorities in any country. One of the purposes of educational research might therefore be to trace, from policies actually pursued, the kind of goal structure that appears compatible with the policy measures taken. Such an analysis may reveal very provocative differences between theory and practice. It might prove to be one of the most effective ways in which the instrument of research can be brought to bear on essential policy issues.

V. International Collaboration

International collaboration ranks among the most potent instruments of research policy in most fields, an instrument, however, which is frequently used far below its potential. Educational research is not only underdeveloped in national contexts, it also scores quite low in terms of effective use of international collaboration.

International research collaboration cannot, however, be an alternative to national research efforts. National research and effective international contacts are, in fact, complementary; the latter serving mainly to improve the quality of the former. This explains why international collaboration does not particularly favour the smaller, and scientifically weaker countries, living from crumbs falling from the tables of the larger ones. It is not only, as stated in an OECD report, that "in front of the massing possibilities and rising costs of science we are all small"(1). The scientifically weaker countries may simply not be in a position to select and digest a significant part of the menu of research information offered through international collaboration.

The case for international research collaboration is easily stated. Most problems studied by research are common to most countries, though not necessarily equally relevant, and the findings should be valid far beyond the borders of any particular country. National research efforts may be conceived of as contributions to a world wide pool of knowledge, available to everyone who wants to make use of it. Each country should be able to draw from the pool much more than they feed into it.

Furthermore, especially in the social sciences where controlled laboratory conditions are more difficult to stage, the world at large constitutes a laboratory of social phenomena, offering a far wider factor set and more varying conditions than any national situation. Only against an international background can the dependence of research findings upon special national conditions be identified, and the validity of results be put to test.

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(1) "OECD Observer, Special Issue on Science", Paris, 1966.

In practice, however, this ideal image of research collaboration has serious limitations. Most frequently referred to is restricted access to research findings in order to safeguard commercial and defence interests. There are some doubts, however, as to the effectiveness of such measures when research results actually lead to application(1). In a field such as educational research, "classified" findings are also unusual, though the problem has arisen in the context of commercially developed educational aids and curriculum programmes.

Another key problem relates to the dissemination of research information which, in principle, is free for all. While in many fields, and educational research is clearly one of them, research documentation has not been well enough organised to permit easy access, even more difficult problems seem connected with the selection of relevant materials. The question of effective documentation presents a number of technical problems, but they can be solved provided the willingness to devote sufficient resources to the task. The question of selecting, among an overwhelming mass of documentation, the few pieces of information relevant to a particular piece of research, has not, however, found a proper answer. As long as this is the case, the effectiveness of international research collaboration is seriously hampered.

One part of the problem, especially in the less "exact" sciences, may stem from traditional attitudes among the researchers themselves, refusing to accept the claim on qualified personnel input involved in effective research communication, and also denying to work in this field the professional prestige and rewards justified by its essential importance. To a considerable extent, however, such attitudes are also the natural consequences of small and badly organised research milieus not able to cope with the need for differentiated research functions. The problem is particularly grave in small countries, but is also clearly present in larger countries with an organisational structure permitting only dispersed and unco-ordinated research efforts.

Various attempts on international co-ordination of research efforts may to some extent be explained on this background. Division of labour within the framework of international research programmes, the establishment of international research institutes, proposals to develop international "centres of excellence" and so on, are all argued for in terms of the pooling of scarce resources, in order to reach a "critical mass". It is a question, however, whether the assumed simplification involved in terms of information selection, does not add significantly to the motivation among researchers. If one could identify in advance a few key institutions from where the essential new research developments are likely to emerge, life would be much easier for everybody involved in both research and research policy.

This particular aspect of international research collaboration may not be fully recognised, and it may involve some danger of reduced alertness and standardisation in the selection of information. There is some evidence that in order to achieve political

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(1) Cfr. e.g. the OECD reports on "the technological gap".

acceptance, co-operative research undertakings at the international level tend to be based on well established research approaches, offering significant possibilities of pay off along traditional lines, but perhaps less chances for pioneering results in high risk areas(1) "Centres of excellence" are far from easy to establish by administrative decree.

Such dangers might be reduced if international research institutions put less emphasis on their own in-house research performance, and more on establishing the widest possible contacts with ongoing research of some promise, encouraging and stimulating such research in various ways. At the same time, a more explicit recognition of their essential function in information selection and dissemination, would be likely to increase the usefulness of such institutions to national research(2). It might also contribute to a raise in the status, also at the national level, of hitherto rather neglected service functions in the research field.

The main difficulty in such an orientation of international efforts on research co-ordination may be the lack of "visibility" of their results. Striking "findings" would not so frequently be directly associated with the international agency, and in terms of the usual national achievement criteria, work with such institutions might be regarded as less rewarding. Even international institutions cannot easily escape the established value structures generated within the research world.

This leads to the perhaps most complicated problem in international research collaboration, the transfer of implicit values embedded in research findings.

In its simplest form, such a transfer of values is implied in the existence of an international research milieu, with its own standards of performance. As in most countries, access to the international league of researchers in one's own field - "international recognition" - is regarded as the prime criterion of professional success, its standards tend to dominate the process of professionalisation among researchers.

This phenomenon is a key to the understanding of why "internally generated objectives" - not shared by outsiders to the research field - tend to dominate the performance of research institutions. In its most striking form it is found in developing countries, causing serious complaints about the lack of relevance to national problems of local research efforts, and being a major factor behind the "brain drain". The phenomenon exerts itself, however, to a great extent also in economically more advanced countries; the lack of strong reactions against it may simply be due to the fact that we have lived with it too long to recognise its full significance.

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(1) The solution may be somewhat different when co-operation is based on special instruments beyond the economic capability of individual countries.

(2) At least in terms of its stated intentions, the CERI appears to me a good example of this type of institution.

We have no guarantee, of course, that those whose prime task it is to define the national needs of our countries, are always able or willing to reach the best possible conclusions. Research is, therefore, not necessarily irrelevant to real needs because it does not happen to coincide with such conclusions; analytical approaches and value structures imposed upon national research by adherence to international standards may well contribute to the identification of problems of real national significance. Yet, the dependence of such standards upon traditional scientific disciplines, and their inherent biases in terms of values, make the beneficial effects of their dominant influence on national research performance doubtful indeed.

Once more, the effect is most serious in the smaller countries, where participation in the international research community easily becomes an objective in itself. Lacking proper criteria for research policy, international recognition tends to become the basis of public support. In those countries the dependence upon international standards is greatest, while the ability to judge sensibly among international impulses is less developed than in the scientifically advanced countries.

The effects of conventional international standards for research may yet represent a minor problem as compared with the transfer of implicit values embedded in research findings. Such findings are, as pointed out in previous chapters, frequently based on research models with a low degree of autonomy, and reflect assumption about outside factors - including objectives to be served - closely connected with predominant national value structures. "Importing" such findings as "scientific", and using them as the basis for further national research involves unrecognised, but frequently quite strong, value biases.

"Research findings" in this context also include methodologies and "schools of research". Such fields as economics, sociology and psychology - all highly relevant to educational research - abound with examples of this kind. Educational cost-benefit-analysis based on wage differentials, the usual kinds of manpower requirement studies, curriculum research, research on individualised instruction and on education for disadvantaged children, are only a few examples of current research approaches usually loaded with implicit value assumptions.

The whole idea of research as a function which shall primarily result in "products" to be disseminated to "consumers" has, in fact, a similar value connection. Assumed problem-solving products of this kind are increasingly distributed also internationally. The weaker the national research efforts, the less chance there is for a critical examination of whether such products meet any real needs. But the product-producing research pattern is adapted, in an attempt to copy apparently "effective" research policies.

What most countries can afford, however, is only to adapt imported "products", and to test them out nationally according to evaluation criteria frequently imported with the products themselves. They become increasingly dependent upon further "product" import, and involved in a process which may prove, in practice, to be irreversible. Current developments in the curriculum fields are well suited as an example here.

The severe problems involved in international research collaboration, as indicated above, should, of course, not be taken as a warning against such collaboration in general. They should, however, be the basis for a profound rethinking of the terms of such collaboration, in order to make it a more adequate instrument for constructive policies in this field. A few hints as to the possible outcome of such an analysis form the final paragraphs of this document.

First, it should be clearly recognised that a solid basis in terms of national research activities and appropriate research organisation is a precondition of the proper utilisation of international research collaboration. The necessary expertise must be available for the substantial task of selecting relevant information, and for critical evaluation, according to national criteria, of research findings.

Secondly, appropriate criteria for national research performance should be developed, and the reward structure in the research field must be adapted correspondingly. Only in this way can the predominance of frequently irrelevant, international research standards be reduced to rational proportions.

Thirdly, it should be fully recognised that the prime means of international research collaboration is the flow of information between active researchers at the national level. Facilitating such flows and their effective utilisation, including the removal of biased selection mechanisms, is far more important than contribution to international bodies for the performance of research.

Such international bodies should primarily be oriented towards stimulating national research, and the effective distribution of information. Their national reward structures, as well as those governing their work in general, should be changed accordingly, thus counteracting the present bias towards favouring primarily individual, scholarly performance. Activities initiated in "member countries" should be generally accepted as the predominant criterion for the evaluation of international bodies.

Correspondingly, co-operative research programmes should be judged by their stimulating effects on national research, and not by their apparent possibilities for saving national research efforts in certain fields. The saving effect will only materialise in the form of qualititive enrichment of the national milieu.

The question of value loading in research findings is primarily a national problem, though it becomes more visible in the context of international collaboration. Its solution also must be found in national policies towards research permitting and rewarding broader research models, crossing discipline boundaries, and allowing underlying assumptions to be spelt out explicitly.

In international organisations for education, there is a tradition of pretending that apart from minor differences, all countries are more or less devoted to the same value structure. At the same time, cases of manifest conflict in political views are referred to as emerging from differences in national conditions(1), which as such should be regarded of no concern to other countries. International collaboration in education - and educational research in particular - would probably benefit from an open recognition of the fact that policies are governed by the different political value structure predominant in the different countries. Similar value structures are, in fact, to be found within most countries, their influence on the existing power structure varying, however, strongly from country to country.

Such recognition, including the realisation that predominant value structures also strongly influence research, would facilitate the critical examination of information provided through international research collaboration. It might also to some extent counteract the tendency for international organisations to propogate implicitly, and often unconsciously, the particular value structures of certain dominant countries.

Finally, the more profound understanding, called for in this paper, of research as an essential function of informative criticism, is also valid in the context of international collaboration. This means that the import of research "products" is not the essential outcome of international collaboration, but the confrontation of different solutions, different alternatives for choice.

There is strong evidence as to the substantial impact of international comparative information in education. No "national traditions" can explain away the fact that some countries keep their children in school much longer than others, and that significant differences exist in terms of social recruitment to further education. We are also gradually developing meaningful comparative measures of at least some aspects of what happens to children in school in various countries, and of the consequences of such differences in treatment. Yet, until recently, relatively small efforts have been devoted to such studies; their potential, therefore, is greater than what is presently shown.

The great promise of international research collaboration will only be fulfilled when international evidence can be used to widen profoundly traditional, nationally bound ideas about what is feasible in education, and the options actually facing us. It will then be realised that aims in education, considered dependent on quite specific procedures, can in fact be achieved along widely different roads, some of them, perhaps, far easier or less costly than those previously assumed. At the same time the value structures underlying choices will have to be explicitly identified since they can no longer be disguised behind the assumed inevitability of traditional means-ends relationships.

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(1) The phrase "national cultural traditions" is favoured in such cases, as a disguise of genuine conflicts about political values.

Such an outcome, however, does not automatically follow from an expansion in international research collaboration. As indicated above, there are forms of such collaboration which may actually work in the opposite direction. National policies, alert to both dangers and possibilities, can ensure the impact of international collaboration in education research set out above. An abundance of research "products" of obscure relevance and value implications cannot attain this, but an enriched process of informative criticism through all the educational system can.